



A SYSTEMS ANALYSIS OF FOOD SERVICE AT ARMY REMOTE AND ISOLATED SITES

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The food service operations in permanent Army small group sites at remote locations were rated very favorably overall by both customers and cooks. In addition, none of the major problems identified in the analysis were both Army systemwide and unique to small sites. Therefore, a completely new food service system for small, remote sites is not recommended. However, a number of -continued-		

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subsystem, site, command, or location-specific problems are identified and must be resolved. Principal among the recommendations for resolving these problems is the implementation of a new food accounting system. The new procedure, called "consumption analysis", provides the managers with greater control on their budgets and, as the results demonstrate, could potentially increase menu variety to the troops. Further recommendations resulting from the analysis are made in this report in the area of administrative training for cooks, staffing levels, equipment and facility support and regulatory changes. *Keywords:*

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PREFACE

This effort was conducted in response to the U.S. Army Troop Support Agency Requirement MSR USA 0-1, "Food Service Systems Support to Personnel at Small Isolated or Remote Locations", under Project No. AH99A of the Department of Defense Food RDT&E Program.

The effective conduct of this project was dependent on the participation of several organizations and individuals. In particular, the authors would like to recognize the following individuals.

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A SYSTEMS ANALYSIS OF FOOD SERVICE AT ARMY REMOTE AND ISOLATED SITES

I. INTRODUCTION

From the Army's earliest experiences, Commanders have been aware that the morale and effectiveness of their troops can be affected by the quality of food they receive. Thus, the Army has continuously sought to improve its food service operations. Today, eligible soldiers receive food as rations-in-kind, completely prepared and served by qualified cooks in permanent dining facilities.

As part of this effort, Army Commanders realize that instances exist where personnel are assigned in small groups to isolated and remote locations, where it is difficult and sometimes impossible to furnish normal food service support. Many of these sites have inadequate power and water resources, old and/or oversized working equipment, and an insufficient number of food service personnel to provide high quality meals. In addition, the distance of these locations from support activities, such as the Troop Issue Subsistence Activity (TISA) and the facility engineers, creates additional hardships on already strained resources. In some cases, the distance and poor road conditions make it impossible to maintain an orderly ration delivery schedule.

The Army currently operates over 200 small group sites around the world, feeding populations ranging in size from a low of 4 to a high of 80 troops. Based on these figures and the above-reported problems, the Troop Support Agency (TSA) continuously seeks to provide special assistance to these remote sites. In FY77 at the request the U.S. Army Communications Command at Ft. Huachuca, Arizona, the Food Engineering Laboratory (FEL) of the Natick Research and Development Center (NRDC) conducted a review of the food service equipment on hand at several remote sites under the 1st Signal Brigade in Korea and the 5th Signal Command in Germany. As a result of this effort, a new kitchen layout containing specialized small-sized equipment and requiring low power resources was developed. This new kitchen was tested in FY83 at a selected 1st Signal Brigade remote site in Korea.

Following the equipment review at several Communications Command remote sites, a more thorough effort was sought by the Army to resolve the majority of the problems perceived on the equipment, operations, personnel, and facilities at these remote sites. Thus, a technical plan responding to this military service requirement and detailing the needed efforts for a complete analysis of these problems was approved in FY80. Commencing the second quarter of FY81, the systems analysis upon which this report is based was initiated. This report details the results of the analysis and provides recommendations for action to furnish high quality food service to troops at remote and isolated sites.

II. TECHNICAL APPROACH

An extensive literature review was conducted to acquire a basic understanding of the general nature and unique problems associated with small group feeding at remote locations. Several group and personal interviews were conducted with personnel from Troop Support Agency (TSA), Food Management Advisory Team (FMAT), the Quartermaster School (QMS) and the Directorate of Facilities and Equipment (DFAE) experienced in small group feeding at remote locations.

Potential problem areas affecting food service operations that were identified included equipment, supply and support logistics, staffing, administration, and food quality. Specifically, surveys (addressing potential problem areas) were to be conducted at a representative number of sites under the following conditions:

- ° the surveys would be conducted at small sites located in Europe and Korea because they appeared to have the most difficulties;
- ° more emphasis would be placed on identifying those problems having a greater effect on the small sites than on the larger facilities;
- ° additional effort would be made to determine not only the overall extent to which the problems exist at these small sites, but also the extent to which the problems are generic to location and command.

Definitions

To ensure an understanding of the terminology used throughout this report the following definitions are included:

- ° Dining Facility: a permanent structure wherein food is stored, prepared, served, and consumed; supervised by an officially named manager, normally an E-5 or higher, who must maintain and is responsible for the accountability of the food service operation. Adherence to AR 30-1¹ is required, including completion of all accounting forms listed therein.
- ° Satellite Facility: a permanent structure wherein food is stored, prepared, served, and consumed; managed by a designee, normally of lower grade than for a dining facility. Final responsibility for maintaining the accounts of this type of facility rests with the manager

¹ AR 30-1, "The Army Food Service Program," HQDA. 21 March 1977

of the dining facility to which the satellite facility is subordinate. Managers of the satellite facility are not required to complete the forms specified in AR 30-1 unless dictated by local command policy.

- ° Isolated Site: a permanent facility manned by less than 100 troops, which is isolated from American Forces and support by distance and geographic terrain, and where personnel are assigned for permanent duty status of one year or more.
- ° Remote Site: a permanent facility manned by less than 100 troops, which is isolated from American forces and support by distance and geographic terrain, for a short period of time (i.e., from 1 day to 1 month).

Survey Site Selection Criteria

The U.S. Army Europe (USAREUR) and the U.S. Eighth Army, Korea were requested to select representative sites from each of their subordinate commands under the following selection criteria:

- ° sites selected would represent various mission assignments;
- ° both isolated and remote sites would be chosen;
- ° site terrain should range from easy to very difficult accessibility (level ground to mountain tops);
- ° sites should be representative of the varying distances to the subsistence resupply points;
- ° populations fed should range up to 80 troops.

Data Collection

A site survey package was developed to determine the operating characteristics associated with small group feeding at remote and isolated locations. The survey package was designed to ensure that the bulk of the data collected was consistent while allowing flexibility in the reporting of unusual situations or problems found at the sites. The survey was divided into four parts each concerned with a major facet of the food service operation. The techniques implemented for the conduct of the survey varied between parts of the package and occasionally between commands, as indicated in the following summaries of these parts.

Operational Survey. Personal interviews were conducted with the dining facility manager at all sites in Europe and Korea using the operational survey forms as a guide (see Appendix A). In the absence of the manager, the food service officer, the noncommissioned officer in charge, or the highest ranking individual was interviewed. The numerical data, such as meal headcounts, were obtained directly from the completed "Subsistence Report and Field Ration Requests" (DA Form 2970) and the "Dining Facility Account Cards" (DA Form 3980-R) available on file at the sites. At certain remote sites where numerical data were not available, headcounts were estimated by the dining facility managers.

Equipment Survey. The interviewer and dining facility manager examined all food service equipment, recording pertinent data including type, manufacturer, National Stock Number (NSN), and current operating status. The managers were also questioned on facility support especially in areas of water and power, and on response characteristics of engineering support. Appendix B contains these survey guides.

Customer Opinion. Because it was anticipated that access to customers in the busy and sometimes classified environments of isolated and remote sites would be limited, a one-page survey form was designed. The form measures customer response to 13 characteristics of the food service system using the seven-point Likert scale. To probe further possible sources of customer opinion, an interview format was designed for one-to-one administration. Because of travel constraints, the interviews were administered only at the Korean sites.

Food Service Worker Opinion. A two-page survey was designed for administration to the food service workers with most questions using the seven-point Likert scale format. After being asked about his or her feeling toward military service, each cook was requested to rate 17 characteristics of the food service operation at his or her site, and to give an overall rating of the dining facility. When applicable, he or she was asked to compare the present dining facility to all others, regardless of type, in which he or she had previously worked. In a separate question, the interviewee was also asked to compare the present facility with other isolated or remote facilities in which he or she had worked. Finally, satisfaction with seven job aspects and the overall job were assessed.

A one-to-one interview was also designed for administration to all available food service workers. Like the customer interview, it also was used only at the Korean sites. Appendix C contains the customer and food service worker surveys and interview protocols.

III. SITE CHARACTERISTICS

Commands

Korea. Data collection was conducted at nine facilities in Korea. Four of the Korean facilities were classified as remote and five as isolated. The length of tour for personnel assigned to two of the remote facilities was 24 hours, and an average of 3 weeks for the other two remote facilities. The length of tour for the five isolated facilities ranged from one to one and one-half years. All the sites in Korea were operated and maintained by American forces.

Europe. Fifteen sites were selected for the data collection effort in Europe. Four of these facilities were classified as remote, with three having an average length of tour of 24 hours and one of three to four weeks. The remaining 11 facilities were classified as isolated with length of tours ranging from 1½ to 3 years.

Eight of the European isolated sites were located on foreign government bases and received much of their support from these governments. This host nation support consisted of providing the assigned U.S. Army personnel with permanent buildings for housing and operations, major food service equipment, maintenance and facility support, and limited food service operational support such as cleaning supplies, plateware, silverware, and pots and pans. Of these eight sites, one site was supported by the Belgique, one by the British, three by the German, and three by the Italian Governments.

Supply Logistics

The type of terrain and distances from Troop Issue Supply Offices (TISO) or Supply Points (SP) differed for Korean as opposed to European sites as shown in Table 1.

TABLE 1. Geographic Characteristics of Sites

Location	Terrain		Distance to Resupply (miles)					
	Mountain Top	Level	10	25	50	75	100	100+
Korea	5	4	4	3	0	1	0	1
Europe	3	12	5	2	4	2	0	2

Of the nine Korean sites analyzed, five were located on mountainous terrain while only four were on reasonably level ground. Four facilities in Korea obtained rations from distribution centers known as Supply Points (SP); the other five facilities were supported by larger dining facilities. These resupply points were located a maximum of 120 miles distant, with the majority being within 25 miles of the site.

Two isolated and one remote site in Korea furnished downrange feeding, which involves the transporting of, or the limited preparation of, hot meals at locations where operational personnel cannot leave their duty station during normal meal hours. One isolated facility served only 2 individual meals downrange every other day, while the other served as many as 70 people downrange. For this last site, downrange feeding was required only when a break in the oil pipeline occurred, usually only once or twice a year.

In Europe, as in Korea, supplies are received from several sources. Ten facilities obtain rations from an Army TISO, one site from an Air Force commissary, and four facilities from larger Army dining facilities. The maximum distance between the surveyed facilities and their supply points was 165 miles with the majority within 50 miles, as shown previously in Table 1. Also, it is important to note that most of the European sites surveyed were situated on relatively level terrain; the three sites in Europe that were located on mountain tops typically were accessible from paved roads as opposed to dirt roads in Korea. During inclement weather these roads were often incapable of supporting vehicular traffic. Helicopters or snowcats were then used to transport supplies.

In Europe, downrange feeding, as previously defined, occurred at 10 of the facilities. Headcounts ranged from one to five at downrange locations with most sites serving three persons per meal on a daily basis. One facility reported feeding 40 personnel 1 day a week in a field environment due to mission requirements.

Although not reported in Table 1, because no on-site data was collected, it is pointed out that distances from the supply points to remote or isolated sites in Greece and Turkey are up to 565 miles for several sites.

Site Population Fed

Approximately 6 months of headcount data were collected at most of the surveyed facilities in Korea and Europe. Two facilities that had consolidated their administration with a larger dining facility could only offer estimates and one facility submitted no separable headcount figures.

Table 2 presents the average headcount by meal for each of the sites. Alphabetic codes were assigned to the sites in order to preserve anonymity. These codes were to remain constant throughout this report, that is, Site A in Table 2 is identified as Site A in all other tables of this report. Average headcounts at any one meal range from a low of 9 to a high of 65 in Europe. In Korea, these averages range from 4 to 77.

TABLE 2. Average Headcounts at 23 Isolated and Remote Sites

Location	Site	Meal		
		Breakfast	Lunch	Dinner
Europe	A	25	31	28
	B	8	11	10
	C	18	18	15
	D	9	11	9
	E	15	19	15
	F	14	19	14
	G	26	26	22
	H	34	47	19
	I	14	15	12
	J	19	22	17
	K	45	40	30
	L	30	30	30
	M	25	38	14
	N	25	65	28
	P	30	30	30
Korea	Q	15	17	15
	R	6	6	6
	S	54	46	42
	T	8	10	9
	U	21	21	28
	W*	40	40	40
	X	74	76	77
	Y	4	4	4

*estimated headcounts as records were not available

Table 3 depicts the average number of daily rations served by number of sites surveyed in Korea and Europe. A ration is the amount of food required to feed one soldier for 1 day (three meals). The combination of one headcount at breakfast, one headcount at lunch, and one headcount at the dinner meal during 1 day constitutes one ration. Approximately 50% of the sites surveyed served an average of 20 or fewer rations per day.

TABLE 3. Average Number of Rations Served by Number of Sites

Korea	Europe	Total	Average Rations/Day	
3	2	5	4	10
1	5	6	11	20
1	5	6	21	30
1	2	3	31	40
1	1	2	41	50
1	0	1	71	80

Totals = 8 15 23 Average = 24

Summary

The five criteria established for the selection of sites to be analyzed were met as shown in part by the previously mentioned results. In particular:

- ° The sites chosen in Korea were under the jurisdiction of five different commands, representing a minimum of five different mission assignments. These Army missions included petroleum, oil, and lubricants (POL) stations, military intelligence, infantry and border patrols, and air defense. Similarly, the sites chosen in Europe were assigned various missions from ground and air defense to border patrols and signal transmission.
- ° Of the nine sites surveyed in Korea, four were classified as remote and five as isolated. In Europe, 4 of the 15 sites surveyed were classified as remote. In addition, eight of the isolated sites were supported by host nations.
- ° The terrain surrounding the sites in both Korea and Europe ranged from level ground to mountain tops. These sites suffered periodically from severe climatic conditions in both Europe and Korea.
- ° Distance from the sites to resupply points ranged from fewer than 10 miles to over 100 miles for the sites in Europe and Korea.
- ° Populations fed at any one meal ranged from 9 to 65 and 4 to 77 for Europe and Korea, respectively.

IV. RESULTS and CONCLUSIONS

Menus and Recipes

The 42-day Master Menu (SB 10-260),² designed to provide the troops with variety and the opportunity to obtain the nutritional intake recommended by The Surgeon General, has been designated in Army Regulation (AR) 30-1 as the primary menu-planning guide for garrison operations.

As stated in AR 30-1, paragraph 3.53(3)c:

"Standard recipes (TM 10-412), Master Menu notes, or SOP normally will be used to prepare all food items. Deviations from the recipe in use will not be made by personnel preparing food without the expressed permission of the food service sergeant."³

Most of the dining facility managers assigned to the surveyed facilities indicated that they adhered to the Master Menu unless constrained by external circumstances. However, these managers have expressed a concern that menu variety may suffer when using the Master Menu for feeding small groups. Because of the limited resources available and the small population to be fed, the managers usually serve only one out of as many as three entree selections named in the Master Menu.

Armed Forces Recipe Cards (TM 10-412) were available at all the sites visited. These recipe cards indicate the quantities of ingredients and production methodology required to prepare food for 100 persons and can be quickly modified by dividing line ingredient quantities for feeding populations of other than 100 customers.

In most dining facility operations food service managers rarely know the exact headcount to expect at the next meal. In most cases food service managers estimate the quantity of a menu item to be prepared by relying on their prior experience. In facilities serving over 100 troops, managers typically prepared a variety of entrees in quantities slightly below expected requirements. By including items that can be prepared quickly to serve additional customers above expected levels, the amount of overproduction and food waste can be reduced.

However, managers of small, isolated, and remote sites often prepare only one entree from the selections listed in the Master Menu for that

² SB 10-260, "Master Menu (for March, 1982)," Department of the Army. Published Monthly

³ TM 10-412, "Armed Forces Recipe Service," Department of the Army, the Navy and the Air Force. 1 May 1980

meal. Because the choice may not lend itself to immediate preparation when headcounts exceed the estimated level, the manager must be more accurate in determining the amount of food to be prepared.

To reduce the problems of dividing and linearly converting ingredient quantities in the Armed Forces Recipe Cards, over half the dining facility managers at the small sites in Europe resorted to using recipes from unofficial and commercially published small quantity cookbooks. However, it has not been determined if any of the recipe formulations in these cookbooks meet the nutritional standards established by The Surgeon General for Army personnel. In addition, because none of the recipe formulations in the commercial cookbooks were costed, the effects that the costs of alternative recipe formulation has on the dining facility accounts is unknown.

Over 15 different small-volume cookbooks were available at the sites in Europe, ranging from the QMS Small Volume Cookbook (Vols. 1 and 2)⁴ to the Joy of Cooking⁵ and the Betty Crocker Cookbook.⁶ Table 4 lists the number of survey sites in Europe using unofficial cookbooks. The regulations allow the food service manager to use alternative military and commercial cookbooks, if the individual commands do not prohibit their use. Sixteen European sites took advantage of this provision in the regulations. In one command (number 2 in Table 4) over six different types of commercial cookbooks were allowed while at another none were allowed. For this last command, any alternative to recipe formulations in the Armed Forces recipe cards was prohibited. Similarly, unofficial or commercial cookbooks were not allowed in Korea. However, one site in Korea did have the Betty Crocker Cookbook for use by four non-foodservice personnel who had to prepare their own meals on the civilian cook's day off.

TABLE 4. European Sites Using Unofficial Cookbooks

Command	Sites Under Command	Number of Sites Using Cookbooks		Number of Unofficial Cookbooks on Site
		QMS	Commercial	
1	3	1	2	4
2	3	1	3	6
3	5	2	1	2
4	3	0	2	1
5	2	0	0	0
TOTAL	16	4	8	13

⁴ QMS Small Volume Cookbook (Vols. 1 and 2), Quartermaster School (out of print)

⁵ Irma S. Rombauer and Rombauer-Becker, Marion. The Joy of Cooking, Bobbs-Merril, Indianapolis. 1975

⁶ The Betty Crocker Cookbook, Betty Crocker, pseudo., Golden Press, New York. 1969 (out of print)

Conclusions. Three conclusions were reached regarding recipe use, unofficial cookbooks, and nutrition. These conclusions were drawn from direct observations, surveys, and interview results.

1. The accuracy of the conversion of the Armed Forces Recipe cards for small quantity recipe formulation becomes more critical to the food service sergeant, as well as more tedious and time-consuming, as the population to be fed becomes smaller.

2. The policy of using unofficial or commercial cookbooks varies widely from command to command. The profusion of commercial cookbooks, 15 in all, available at the isolated or remote sites surveyed, indicates that the food service sergeants will avail themselves of this alternative when permitted.

3. The effect that commercial cookbook recipe formulations have on the nutrition received by the soldier, or on the dining facility food account, is not precisely defined.

Staffing

For the purposes of this section of the report, the isolated and remote sites will be further classified into those operating as satellites from another, larger facility, and those sites that operate as stand-alone main dining halls. The distinction is made solely on the basis of accounting -- the satellite manager forwards his facility accounts for consolidation with another, larger facility.

The quality of food service supplied to the troops at these remote and isolated sites is largely dependent on the caliber of the food service management and the number of cooks available. Because the level of management and staffing were two major questions during the preliminary stage of this effort, data were collected in these areas. A noticeable difference was found in the rank of management between Korea and Europe at remote and isolated sites. The military ranks of food service management for the sites in Korea were considerably lower than those employed in Europe and did not exceed the rank of E-5. The rank of food service management by location, type of facility, and average number of daily rations served is presented in Table 5. The two civilians were Korean national citizens and had over 10 years of experience at their positions.

TABLE 5. Rank of Food Service Management

Type of Facility	Daily Rations	Korea*		Europe	
		No. of Sites	Rank	No. of Sites	Rank
Satellite	4 - 9	2	Civ	0	0
	20 - 29	1	E-2	1	E-6
	30 - 39	0		2	E-5
	40 - 49	1	E-5	1	E-7
Dining	4 - 9	1	E-5	1	E-6
	10 - 19	1	E-5	5	E-6
				1	E-5
	20 - 29	0		2	E-6
	30 - 39	0		1	E-6
				1	E-7
	40 - 49	1	E-7	0	
	70 - 79	1	E-6	0	

*no data available for Site V

For the dining facilities, military personnel exclusively were assigned as managers in both Korea and Europe with their ranks ranging from E-5 to E-7. The majority of personnel in these management slots are of grade E-6 for Europe and E-5 for Korea. However, at the time of this survey, the two least populated sites in Korea were managed by the same E-5 for the interim period between the previous manager's departure from the smallest site and the arrival of the new manager, who was expected to be an E-5 also. The interim period had already lasted 2 months. Overall, the median level of management for all the sites surveyed was at the E-6 level; however, many sites were managed by lower rank and perhaps less "seasoned" or well-trained personnel.

The number of cooks, both military and civilian, that were assigned to each isolated/remote site and dining facility surveyed were also recorded. These numbers were compared to the staffing levels provided in the "Staffing Guide for U.S. Army Garrison" (DA PAM 570-55),⁷ which are based on a 40-hour workweek and expected individual performance at an average level. The guide stipulates that every effort should be made to operate within these allowances or with less manpower than indicated. Table 6 lists, by type of facility, the various staffing levels and the respective number of sites surveyed at each level for each location. Also shown in this table is the number of cooks, including the dining

⁷ DA PAM 570-55, "Staffing Guide for U.S. Army Garrison," Department of the Army. October, 1980

facility manager, which is over or under the prescribed staffing level. These results do not include KP requirements, nor is Site V included because data was not available.

TABLE 6. Foodservice Staffing - Assigned vs. DA PAM 570-55 Levels

Type of Facility	Korea			Europe		
	No. of Sites	DA PAM Level	Total Over(Under) Assigned	No. of Sites	DA PAM Level	Total Over(Under) Assigned
Satellite	1	2	(1)	1	4	(3)
	1	3	(1)	2	4	(2)
	2	4	(6)	1	4	2
Subtotal			(8)			
Main Dining	1	3	(1)	1	3	0
	1	4	(2)	1	3	1
	1	4	1	4	4	4
	1	5	(1)	2	4	0
				2	4	2
				1	4	5
Subtotal			(3)			
Grand total			(11)			

There is considerable variation between these sites with the isolated and remote facilities in Korea having fewer cooks than any other group. Specifically, two isolated/remote Korean facilities were each staffed by 1 cook who prepared food for 22 to 40 patrons, while a dining facility in Europe was staffed with 9 cooks who prepared food for an average of 33 customers. Comparing the observed staffing levels to those suggested in DA PAM 570-55 for sites with these average headcounts, it is clear that Korean sites (at least those surveyed) are more severely understaffed than are those in Europe.

Conclusions. The following conclusions were reached on staffing of isolated and remote sites in comparison with main dining facilities and variations in practice in Europe and Korea:

1. The majority of the military isolated/remote and dining facility managers in Korea are below the enlisted grade level as suggested in DA PAM 570-55. In fact, there was only one E-6 and one E-7 at sites surveyed in Korea. On the other hand only 13%, or 2 of the 15 dining and satellite facilities in Europe were managed by personnel lower than an E-6.

2. The overall staffing levels for the sites surveyed in Korea are 11 cooks under the suggested levels, while surveyed European sites in total are 1 cook over the suggested level. The 2 Korean sites with only 1 cook each, feeding 22 and 40 patrons, contributed greatly to the lower overall total for that country and its relation to the European total. However, the additional fact that all sites but one in Korea were understaffed, while only 7 out of 15 surveyed sites in Europe were understaffed, indicates a more pronounced food service staffing shortage in Korea.

3. The overall results of the analysis of the ranks of managers and the number of assigned cooks indicate some shortages. While Europe may contain some sites that need additional cooks or higher ranked managers, overall staffing and management grades were adequate. However, the number of cooks assigned and ranks of management personnel at the Korean sites were markedly lower than those in Europe and are inadequate when compared to the staffing levels suggested in the pertinent DA pamphlet.

Administration

Food service advisers, unit commanders, FMAT and TSA personnel have remarked that the administrative requirements for a food service operation, particularly the paperwork, have increased in recent years. In most cases, for the larger facilities -- those feeding over 100 troops -- a full-time clerk facilitates the timely completion of appropriate forms. Army Regulation AR 30-1 (para. 3-18) states that:

"A military or civilian clerk may be required in all active Army...dining facilities regardless of size...or headcount..."

However, only one of the 24 small isolated or remote sites surveyed had a clerk assigned, and that assignment was only part-time. Managers at these small sites, and probably others as well, must allocate more time to administration because they do not have clerks to reduce the burden.

Approximately 50 different forms used for dining facility operations are listed in AR 30-1. Many of these forms are specific to one of the three accounting systems implemented by the Army: the Monetary Allowance Ration System (MARS), the Field Ration Issue System (FRIS), and the Army Ration Credit System (ARCS). Although for the most part MARS is discussed separately in the regulation, no such distinction is made between FRIS and ARCS. Since all the remote and isolated sites surveyed operate under the same accounting system (ARCS), this analysis will be limited to ARCS.

Table 7 presents the more important forms and pamphlets required under ARCS, their updating rate, and the amount of time the forms are maintained on active file. Of these, the dining facility manager updates most frequently approximately nine of the forms: specifically, the headcount sign-in and summary forms, the cooks' worksheets, the ration request form, and the account card. The manager must complete these forms and maintain each on active file for a minimum of 3 months. At one time, the manager may have over 900 completed forms in the active file. This number reflects just the nine most actively used forms named above. In addition, many of these forms must be maintained on an inactive file for an additional 3 months. These files must be maintained by all dining facilities regardless of size.

The numbers of forms used by the facility managers are listed in Table 8 by type of site and center of accountability. Only one site surveyed in Europe completed none of the forms listed in AR 30-1. This remote site was a satellite facility that conveyed meal headcount by telephone to the main dining facility. All other surveyed sites in Europe, including three of the four satellite facilities, adhered to all the administrative requirements of AR 30-1. In Korea none of the five satellite facilities conformed completely with the administrative requirements of AR 30-1. The two satellite facility managers in Korea who did the most report preparation completed up to three forms listed in the regulation -- the headcount, inventory, and request for issue forms. The four dining facilities surveyed in Korea adhered to the regulation. Overall, 18 of the site managers surveyed completed the required forms for ARCS.

TABLE 7. Major Forms Required by ARCS

Operational Data	Specific Use	Form Number	Form Title	Update Rate	Inactive File
Headcount	Patron Sign-in	DA 3351	Signature Headcount	By Meal	3 Months
		DA 3032	Dining Facility Meal Register	By Meal	3 Months
		DD 1544	Cash Payment Sheet	By Meal	1 Year
		DA 4807-R	Request for Payroll Deduction (Subsistence)	By Meal	1 Year
	Summary Forms	DA 3033	Headcount Record	Daily	6 Months
		DA 2970	Subsistence Report & Field Ration Request	Daily	3 Months
	Control Forms	DD 1544	Cash Meal Payment Sheet Register	Daily	1 Year
		DA 3546-R	Control Record for Dining Facility (DD 1544)	--	1 Year
		DD 1131	Cash Collection Voucher	Turn-in	1 Year
		DA 4548-R	Subsistence Record for Payroll Deduction	Cash	1 Year
		DA 4550-R	Meal Card Verification Form	Specified	1 Year
		DA 4808-R	Table of Meal Rates	Monthly	6 Months
Food	Planning	DA 3069-R	Frequency of Serving: Annual Food Plan	Yearly by TSA	1 Year
		SB 10-260	Monthly Master Menu	--	--
	Production	DA 3034	Cook's Worksheet	By Meal	3 Months
	Ration Request	TM 10-412	Armed Forces Recipe Card	--	--
		DA 3294-R	Field Ration Issue Slip	By Issue Cycle	3 Months
		DA 3161	Request for Issue or Turn-in	By Issue Cycle	3 Months
Inventory		Other	Other Form or Combination of Forms Designated by TISA	By Issue Cycle	3 Months
		DA 3234-R	Inventory Record	Monthly	--
Accountability		DA 3980-R	Dining Facility Account Card	Minimum 3 Times Per Month	6 Months
Equipment & Facilities		DA 3988-R	Dining Facility Equipment Replacement Record	As Ordered	Indefinitely
		DA 4696(test)	Government Property Lost or Damaged Report	As Required	6 Months
		DA 4697	Report of Survey	As Required	6 Months
		QDR	Quality Deficiency Reports	As Required	6 Months

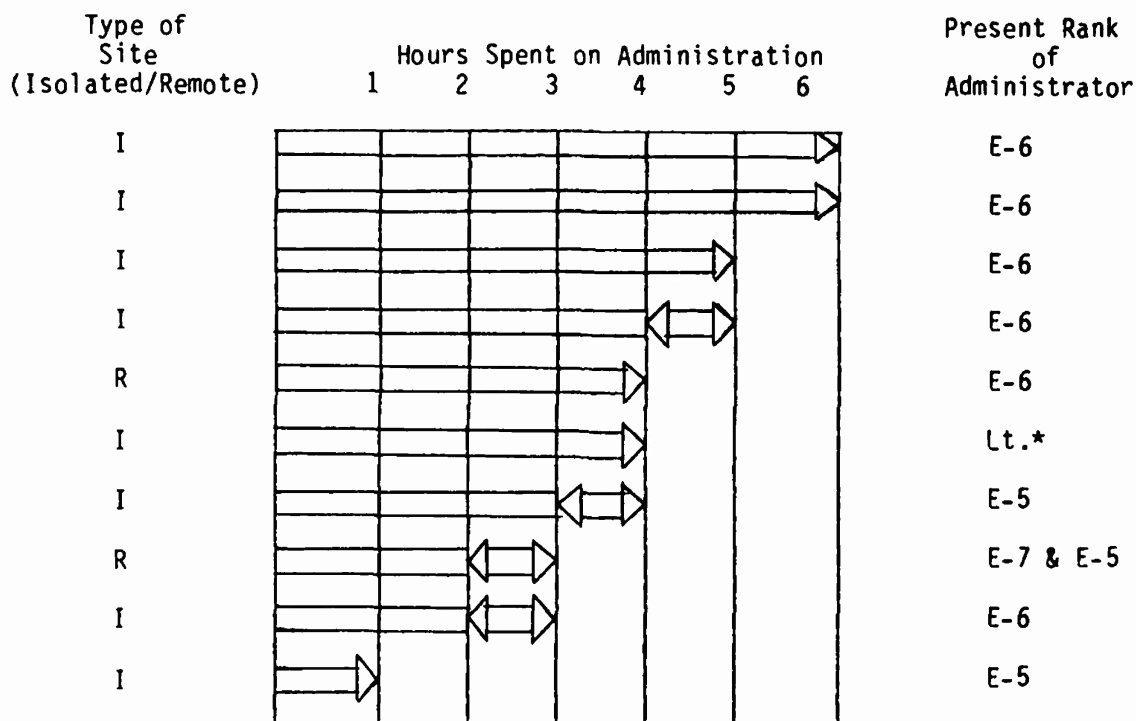
TABLE 8. Site Utilization of Forms

Area	Type of Site	Type of Facility	Numbers of Forms Hdcnt				No. of Sites
			All	3+	Only	None	
Korea	R	SF		1	1	1	3
	R	DF	1				1
	I	SF		1	1		2
	I	DF	3				3
		Subtotal	4	2	2	1	9
Europe	R	SF	3		1		4
	I	DF	11				11
		Subtotal	14		1		15
Grand Total			18	2	3	1	24

It may be concluded that administrative policies differ between Europe and Korea, as Table 8 indicates. Satellite facility managers at three remote sites in Europe are required to accomplish the same amount of administrative paperwork as the dining facility managers. This is not required of the Korean satellite facility managers. The forms from the European satellite facilities are consolidated by the main dining facility manager into his account and are then discarded (in most cases). At one satellite facility, only signature headcount sheets were kept by the main dining facility manager although the site manager had completed all the forms required by local command policy including his own dining facility account card.

Satellite facility managers usually have no longer than a 1-month assignment, after which they are rotated back to the main dining facility for cook duty. Other cooks are then assigned to these management positions. These cooks/managers are given some guidance from the dining facility managers at the main dining facilities. Although this policy should provide some training to these cooks for future management responsibilities, potential personnel and operational problems often occur and require these satellite facilities to operate at the same level of accountability as the dining facilities. This responsibility is explained in more detail in the "Operations Management" section of this report.

Administration is an important function in the food service program, and satellite and dining facility managers in Europe were requested to estimate the amount of time spent on this function during the day. Responses were obtained from 10 of the managers and are reported in Fig. 1. The figure lists the type of site, the rank of the person performing the administrative tasks, and whether he or she was the satellite or dining facility's manager.



*The lieutenant covering for the dining facility manager who was in the hospital was the Food Service Officer of the site.

FIGURE 1. Duty hours spent on administration.

The majority of the administrators had ranks of E-6, with five of the six E-6's requiring the most time of all managers to perform the administrative tasks. The only E-7 that responded had an E-5 as a part-time clerk to help him in this area, so his reporting required only two to three hours per day. The two E-5 personnel estimated considerably less time than the majority of those surveyed. This may have been due to the temporary nature of their position, which was beyond their usual duty assignments. Overall, the estimated amount of time spent on administration ranged from one to six hours, with the median response at four hours.

Although AR 30-1 provides direction for completing over 50 forms, only about 20 forms actually are required for documenting daily dining facility operations. A flow chart of these 20 most commonly used forms and updating cycles is displayed in Fig. 2. Four of these forms require particular attention -- the cook's work sheets (DA 3034), the issue ordering forms (DA 3294-R and/or DA 3161), the inventory record (DA 3234-R), and the account card (DA 3980-R).

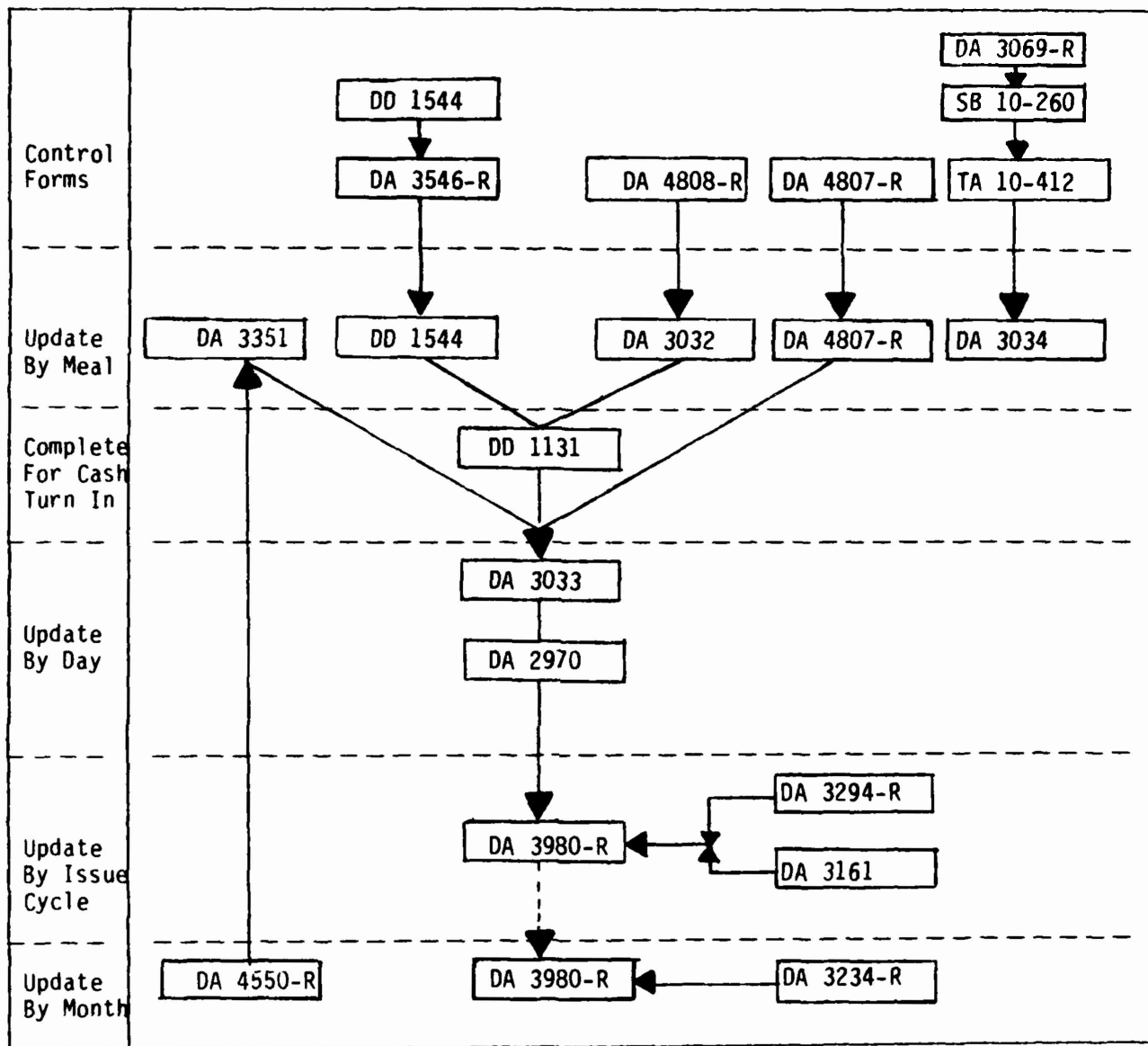


FIGURE 2. Flow of accounting forms.

Of these, the account card has the highest command visibility and is the most important to the managers. It is currently used to measure the managers' monthly operating efficiency by comparing the cost of monthly subsistence purchased with credits earned. The managers must be aware of food costs and adjust purchases to satisfy this requirement. When ordering issues, the managers attempt to provide a varied menu while maintaining their accounts in good stead. Once the issues are

purchased, the managers must decide when to serve the food items purchased to ensure sufficient variety to the troops. This decision is made before the cooks' worksheets are prepared. Although the Master Menu and Recipe cards are available to assist the manager in these decisions, for effective, efficient operations the managers must spend much administrative time on planning.

The administration of an Army food service operation requires the satellite and dining facility manager to understand fully the underlying concepts of the food service regulations (AR 30-1 and AR 30-18)^{1,8} in order to furnish high quality food service within the allowable cost constraints. He or she also must comply with directives established by unit commanders, the Troop Issue Support Officer (TISO), and higher headquarters. During the site surveys, several satellite and dining facility managers enumerated some of the problems they faced in complying with these regulations. Managers made the following observations.

Three Korean Sites. When commenting on the DA 3980-R, Dining Facility Account Card, dining facility managers at three sites in Korea (each obtaining their rations from the same TISA), reported that administrative form due dates (suspense dates) established by the TISO were restrictive. At these three sites, the following procedure for reconciling the accounts was used. First, 7 days after the manager purchased issues, he received a letter or phone call verifying the amounts and total costs of items purchased, with little discussion concerning the accuracy of the account. Second, the account card was reconciled monthly on the 10th day of the month (following the month in which purchases were made). The managers reported that this method of operation afforded them no opportunity to adjust purchases to bring their accounts into tolerance by the end of the month. Nevertheless, these facilities were operating, in most cases, within established tolerances. It should also be noted that in almost all other sites the procedure specified in AR 30-18 was being followed. The TISOs were providing a program by which the "DA 3980-R will be reconciled on the 10th, 20th, and last day of the month (AR 30-18, para. 8-12 sub para. d (11)). Normally, on specified dates, the dining facility manager worked with the TISO or his representative and reconciled the account on the spot.

Dining facility managers at the three Korean sites also commented upon the DA 3161: "Request for Issue or Turn-In". This form is used to request rations and to turn in excess rations at these three sites. The TISO directed that the forms be turned in to the TISA 7 days in advance of ration pickup. This policy created two problems. First, if immediate additional supplies were required, due to visitors or fluctuations in headcount, the managers had difficulty obtaining supplies. Second, in conjunction with completing the DA 3980-R, the managers would have to know 7 days before the end of the month what the

⁸AR 30-18 Army Troop Issue Subsistence Activity Operating Procedures, HQDA Washington, DC. 12 October 1976

excess in rations would be to keep the account in tolerance. Because these three sites received issues twice a week, this time period was clearly impossible. The managers could turn in up to five items to the TISA on their commander's signature; however, the turn-in could only be made on the next day after submission of the DA 3161. Because of the location of the sites -- one was 120 miles away from the TISA -- and the limited availability of transportation, this requirement made it extremely difficult to turn in issues.

A third concern of the managers in the three Korean sites related to the use of the food price list. The TISA operations usually provide the dining facility managers a food item price list some time prior to the month in which the prices were in effect. According to AR 30-18, (para. 6-7):

"the command-wide price list will be effective for one accounting period, beginning with the first and ending with the last day of the month...Sufficient space will be included...to permit TISO to record price changes for local purchase items on a monthly basis."

However, a review of completed purchase requests from the three sites indicated that the TISA was effecting price changes during the month after the official price list was released. Although the price changes noted on the requests were for low cost items, such as #10 cans of peas, the effect on the dining facility account was felt by the managers. For example, at one site that fed an average of four troops, a difference of \$16.00 between the issues purchased and the credits earned for the month created an out-of-balance account.

Three European Sites. The dining facility managers at 3 sites in Europe who obtained issues from two different TISA organizations had to purchase meat items by the case lot, which was normally 40 pounds. One manager, for example, ordered 15 pounds of corned beef when the item was first offered by the TISA and received a case of 42 pounds. The manager was charged the total cost of the case and was told that in the future he would have to order by the case. When asked, one food service advisor stated that the managers were required to order meats by case lots because the local veterinarians at the TISA feared that unused portions of a case of meat would become contaminated.

Two problems result from this policy. First, because these 3 sites support from 9 to 25 personnel, ordering meat items by case lot may adversely affect the manager's food account. A site may not be able to use an entire case of meat in the month of purchase, yet it must bear the total cost of the purchase in that month. Second, because the dining facility manager must order meat items by case lot, no documentation of the site's actual usage exists. As a result, the TISA has no verification that the site requires a more accurate ration breakdown.

Several of the small remote and isolated site managers in Europe felt they were at a disadvantage due to the lack of transportation available and their long distance (up to 165 miles) from the TISA. Most of these sites are not large enough to have more than one vehicle assigned, so, typically, additional duties such as Commander's Call must be completed prior to issue pickup. By the time the managers arrive at the TISA, most of the managers of the larger dining facilities located on base have already made their purchases that day. The small site managers have complained that after the larger facilities have obtained their rations, very little variety remains.

A similar problem was reported by the host-nation-supported, dining facility managers. These managers are often dependent on host nation transportation and drivers for ration pickup. The drivers, being host nation soldiers, were often not released for driver duty prior to 9 a.m. by their commanders. Once released, the drivers occasionally had difficulty obtaining the vehicle required, because it was needed to fulfill other host nation mission requirements. For these reasons, the managers often did not arrive at the TISA prior to 10 a.m. and had to choose rations from what little remained.

Many of the small sites must operate 24 hours a day, every day of the year, because of mission requirements. This fact requires that unit commanders establish shift schedules for manning. However, none of the dining or satellite facility managers offered a midrats or fourth night meal. They point to the excess administrative and control requirements established in AR 30-1, (para. 3-9). But the managers at four sites in Korea and nine sites in Europe did offer some form of late night snacks. At some sites, the soldiers who partook of late night snacks did not have to sign for them, while at others they signed the headcount sheets for the previous supper meal.

Most of the sites provided food service for 90 minutes at every meal. However, three sites remained open for only one-half hour at each meal. The managers stated that the unit commander had ordered the shortened meal period. The reduced meal period may cause several soldiers to miss meals due to mission requirements. The reasons given by unit commanders for shortening the meal periods were either reduced headcounts or mission requirements.

Conclusions. The comments obtained from managers at several remote and isolated sites in Europe and Korea, as reflected in the above results, lead the authors to the following conclusions:

1. The dining facility managers at small sites must be not only good cooks and managers, but must also be accomplished file clerks, able to supply the appropriately filed forms to meet all inspection, command, and regulatory requirements.

2. The dining facility managers' more time-consuming administrative tasks involved the planning of daily operations and the preparation and completion of four forms.

3. The preparation of the cook's worksheet, DA 3034, places an excess burden on the dining and satellite facility managers at several of the small sites. According to AR 30-1, the worksheet is only a management tool by which the manager can schedule his production. The manager uses this form to keep track of work in progress, especially where the kitchen and the number of working cooks are large. Because over half of the small sites have a total of three or less cooks working in areas slightly larger than a household kitchen, verbal instruction is the easiest and most common procedure for scheduling production. Yet site managers still must prepare the cooks' worksheets where posted times for item preparation are rarely followed. This unnecessary task impinges on the manager's availability for necessary operations, especially for those sites manned by only one cook.

4. Operational documentation required for satellite facilities is not clearly defined in AR 30-1. None of the satellite facilities surveyed in Korea were required to provide the total documentation listed in AR 30-1, while three out of four of the satellite facilities surveyed in Europe were so required. Differences were noted among Korean sites. One such site provided no documentation, two documented only headcounts, and two others provided two to three additional types of documentation.

5. Several inconsistencies in the interpretation of AR 30-1 were evident at many small sites. Examples of these inconsistencies are described in the results section and include:

- ° although a late night meal was not authorized at any of the sites surveyed, a late night snack was offered at many of the sites. However, the accountability for these extra rations differed from site to site.
- ° most site managers maintained a 90-minute meal period. However, three facilities remained open for only 30 minutes, to the possible detriment of some on-duty personnel.

6. Several inconsistencies were also noted from one TISA operation to another and may have resulted from different interpretations of AR 30-18. Examples of the inconsistencies include:

- ° restrictive suspense dates on the issue ordering forms and for reconciling the account card at one TISA.
- ° price changes of issues during the month they are in effect.
- ° two TISA operations requiring small site managers to order meat items by case lots.
- ° preferential handling of larger dining facilities by the TISA.

Operations Management

Two major objectives of the Army Food Service Program (AR 30-1) are to provide every active duty Ration-in-Kind (RIK) soldier with his basic entitlement of food while ensuring the most effective and efficient use of resources available. In essence, the dining facility manager is required to provide each active duty soldier with his entitlement to the Basic Daily Food Allowance (BDFA), as well as effectively and efficiently managing the food service operation, (monies, personnel, etc.). This section will be mainly concerned with the efficient utilization of food monies, by examination of the dining facility account cards and their relationship to the soldiers' entitlements. In particular the discussion of operations management will attempt to answer three questions:

1. Are controls on food cost adequate?
2. Are inventory levels properly managed?
3. Are the soldiers receiving their BDFA entitlement?

This section will not attempt to answer the question of whether the supplemental allowances over and above the BDFA provided to many, but not all of these sites, are adequate. To determine the adequacy of the supplemental allowances, not only must an analysis of the utilization of monies budgeted to these sites for food service be conducted, but also a careful review of food purchases (by item), and a close examination of the individual site manager's menu planning and recipe formulations are required. This was not possible during the site surveys due to time constraints.

Food Cost Control. Under ARCS, the first warning sign that food purchases of a dining facility are out of line is an index called monetary status. This index is computed by the TISO and the dining facility manager on the "Dining Facility Account Card" (DA 3980-R) and is the difference between the cost of issues purchased and the cumulative allowances earned by the dining facility. In essence, the monetary status is the amount of money spent on issues over/under the credits earned. Whenever the monthly monetary status of a dining facility exceeds a tolerance range of $\pm 3\%$ of the cumulative allowance earned, the dining facility manager and the food service adviser are to attempt to determine the causes and take remedial action required to bring the account within tolerance. Causes for an out of tolerance status at the small isolated and remote sites are many and include high cost for small quantity food items, sudden fluctuations in headcounts, insufficient ration breakdown, or high waste factors due to overproduction. For these small sites remedial actions taken for correcting this situation have ranged from a "wait and see" attitude by the food service adviser to relief from duty of the dining facility manager. Essentially, monetary status is a primary consideration in management strategies of the food service sergeant.

Monetary status data were obtained from 9 of the remote and isolated sites surveyed and from 25 additional large dining facilities (those feeding over 100 troops per meal) of one major command in USAREUR. The data represents a total of 281 months of dining accounts. Table 9 summarizes the number of months the dining facility accounts were within or out of tolerance for all the surveyed sites of Korea, Europe, and the large facilities of the USAREUR command.

TABLE 9. Dining Facility Monetary Status

	Within Tolerance	Out of Tolerance	Total
Korea	41	6	47
Europe	48	36	84
USAREUR	96	54	150
Total	185	96	281

Overall, the dining facility accounts of the small sites and the large facilities were out of tolerance 96 of the 281 months, or 34% of the time, indicating that food service sergeants have some difficulties in controlling their purchases. For the small sites in Europe, the dining facility accounts were out of tolerance 36 of the 84 months, or 42% of the time. This is comparable to the percentage of months the major USAREUR command dining facilities accounts were out of tolerance. In fact, the differences between the small sites and the large facilities in Europe are not statistically significant.

The similarity between these two groups may result from a policy of fiscal year accountability implemented by the food service advisers in Europe. These advisers allow a dining facility manager to operate in an "out of tolerance" status for many months. While the facility manager is in this status, the food service adviser provides limited guidance and suggests corrective actions so that the account can be brought within tolerance by the end of the fiscal year. This approach is probably a consequence of the large number of dining facilities assigned to each food service adviser rather than a special accommodation to the unique needs of small sites. One food service adviser, for example, was assigned over 65 sites dispersed throughout Germany, while another adviser was assigned 26 sites located in three different countries in Europe.

As indicated in Table 9, the Korean data were dramatically different from the other two groups. In Korea only 6 months (13%) of the accounts were out of tolerance. In fact, the probability that the results of the Korean data are significantly different from the European groups is 0.9998. As with Europe, the accountability policy of the commands in Korea may have direct bearing on these results. For the small sites in Korea, if the dining facility account is out of tolerance for 1 month, most unit commanders require that the causes be identified and a course of remedial action be implemented. If the account is out of tolerance for 2 consecutive months, then an Army Audit Agency (AAA) audit of the dining facility account is requested by the commander. This action is taken whether the account is 1, 2, 20 or any other percentage over/underspent. According to personnel high in one unit chain of command, this course of action has led to the removal of two food service sergeants.

The over/under drawn percentage for the above 281 months of data was computed by dividing each monetary status by its corresponding cumulative allowance. The distribution of the over/underdrawn percentages for Korea is presented in Fig. 3, for Europe in Fig. 4, and for the major command in Europe in Fig. 5.

% of
months

□ In Tolerance
▨ Out of Tolerance

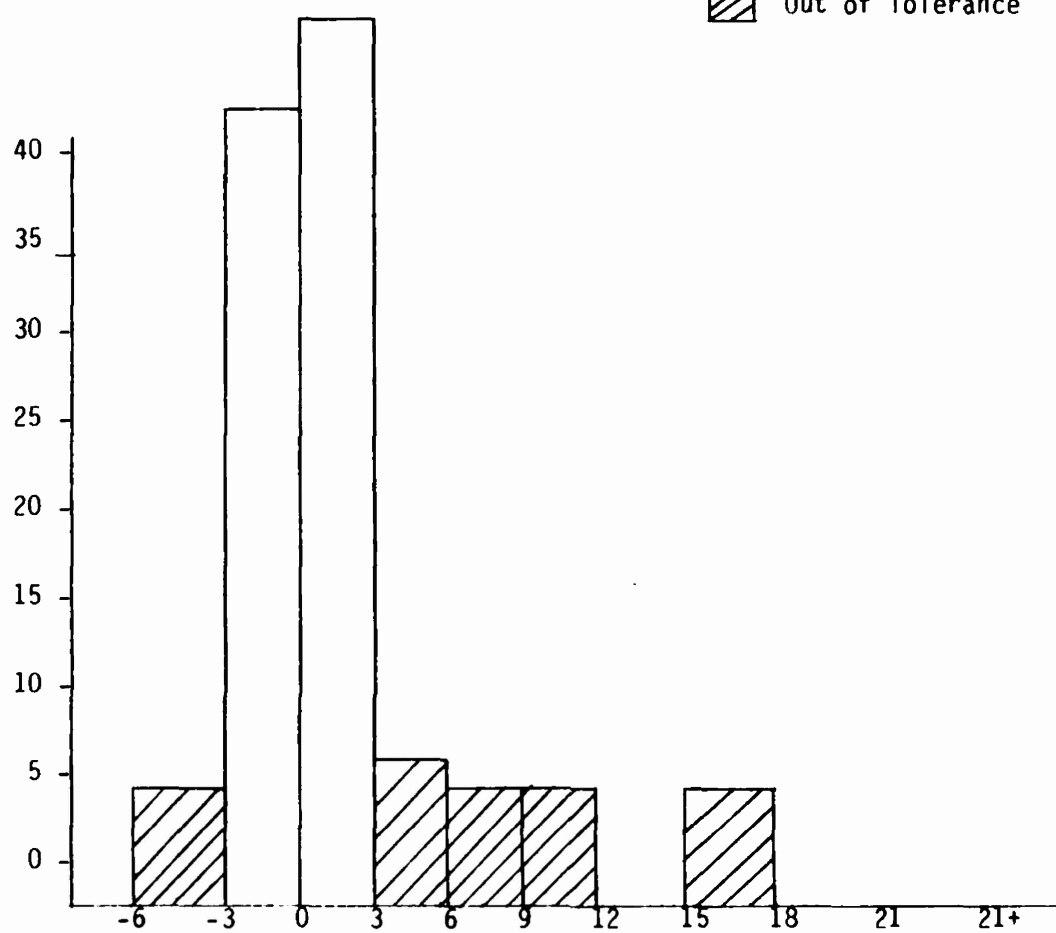


FIGURE 3. Over/Underspent accounts - Korea.

% of
months

□ In Tolerance
▨ Out of Tolerance

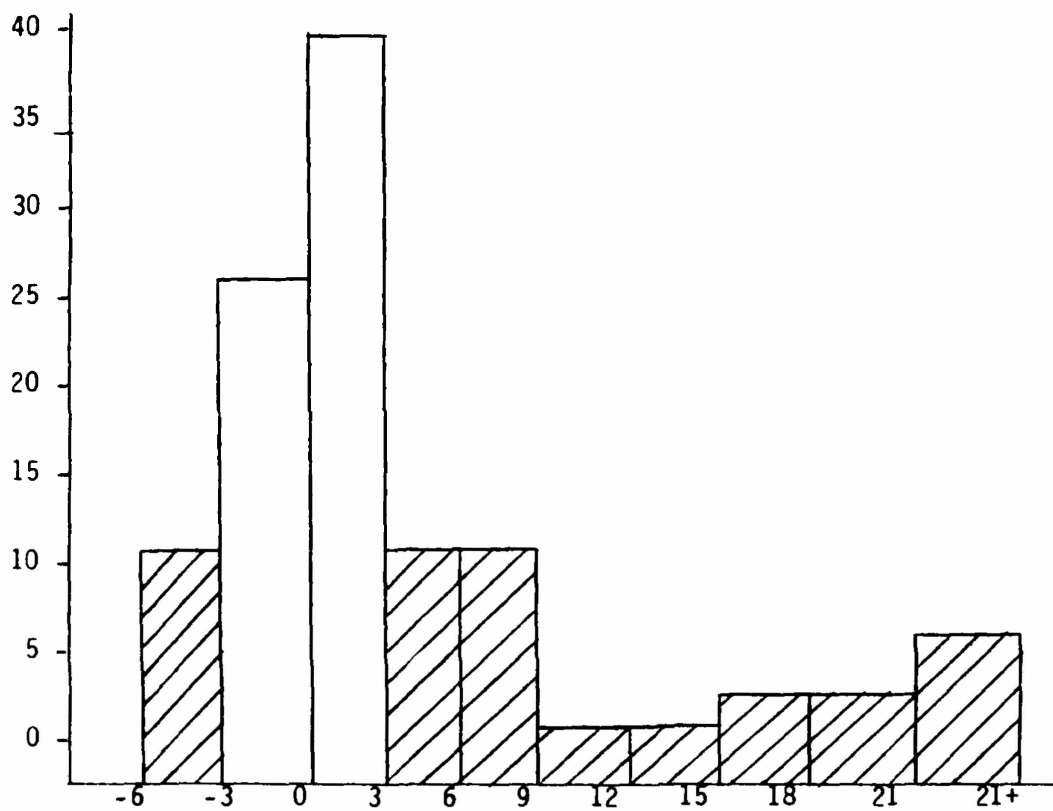


FIGURE 4. Over/Underspent accounts - USAREUR.

% of
months

□ In Tolerance
▨ Out of Tolerance

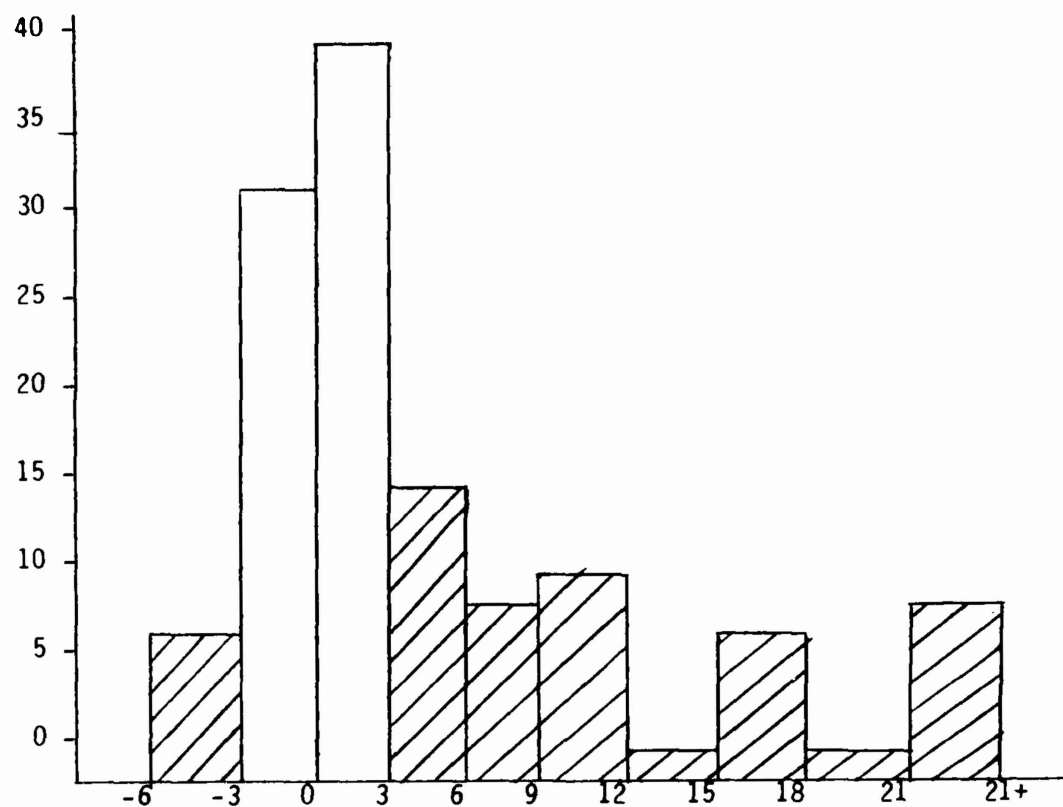


FIGURE 5. Over/Underspent accounts - MACOM, Europe.

Three points can be made from these distributions. First, as shown above, the monetary status is within $\pm 3\%$ of the cumulative allowance a majority of the time. Second, since the over/underdrawn percentages were greater than zero for 55% of months in Korea and over 63% in Europe, the dining facility managers spend more on issues than on allowances earned the majority of the time. Third, the level of an out-of-tolerance account is more likely to be highly positive and higher than negative. At most only 15% of the data indicated an underdrawn status for the three groups, and the percentage was never lower than -12%. However, 10% of the data from Korea, 28% of the data from Europe, and 32% of the data from the major command in Europe were calculated to be overdrawn by more than 3%. Additionally, the upper limit of the overdrawn accounts (a) for Korea was 1 month at 15.3%, (b) for the small sites in Europe 5 months of data were calculated to be overdrawn by 21% with the highest at 37%, and (c) for the large dining facilities of the major command, 6 months of data were computed as overdrawn by 21% with the highest at a 94% overdrawn status.

Conclusions. The above analysis and results support the following conclusions:

1. Several of the small satellite facilities, especially in Europe, are budgeted to only $\pm 3\%$ of the BDFA for each ration served, a clear misunderstanding of AR 30-1. Specifically, a supplemental allowance is authorized by AR 30-1 to small sites feeding less than 100 troops, and not consolidated with a larger facility, thus acknowledging that small sites incur proportionally higher costs than the larger dining facilities. In essence, it is anticipated that increased costs incurred by the small consolidated sites will be absorbed by the larger facility, which has a larger base of funding, without incurring some form of penalty to the small site satellite facility manager or patrons, such as less variety.
2. Although food purchases are within specified tolerances most of the time, an out-of-tolerance status for 34% of the time indicates that some managerial problems in controlling food costs exist.
3. The fiscal year accountability policy of Europe versus the heavy command emphasis on monthly accountability for dining facilities in Korea may be the primary reason for the significantly lower occurrence of out-of-tolerance accounts in Korea than Europe.
4. Irrespective of site size, dining facility managers tend to spend more on purchases than they earn as credits. In fact, a small percentage of the facilities, especially in Europe, can be expected to overspend their earned allowance by 20% or more.

Inventory Management

The tendency of dining facility managers at the small remote and isolated sites to spend more on issues than allowances earned, as shown

in Figs. 2, 3, and 4 may result from building inventories in excess of need. Excess inventory has been defined in AR 30-1 (para. 3-43) as "inventory over and above requirements to feed expected headcounts for one issue period." The issue period is defined to be the time between purchases plus 1 day. This subsection will examine inventory levels at these small sites.

The analysis of inventories utilized the dollar values of the end-of-month (EOM) inventories available at several of the sites, as recorded on their Dining Facility Account Card (DA 3980-R). Since daily inventory reports are not maintained at any dining facility, end-of-the-month (EOM) inventories would, at least, provide an indication of the inventory levels that are maintained throughout the month. Approximately 5 consecutive months of EOM inventory values were collected from 13 sites, representing 61 months of data.

For each site the EOM inventory values were converted into ration days which is defined as the number of days of food supplies in EOM inventory based on the average number of daily rations served by the site. In addition, calculations were made on the maximum ration days a site can have in the EOM inventory before inventory is considered to be in excess. The methodology and examples of these calculations are presented in Appendix D. Table 10 presents the results of the above calculations for each of the 13 sites in each of 5 consecutive months.

TABLE 10. Excess Ration Days in EOM Inventory by Site*

Site	Resupply Schedule (times/wk)	Max. Inv. w/o excess	Excess Ration Days in EOM Inventory each Month				
			1	2	3	4	5
G	3	4	0	0	4	**	**
H	3	4	2	3	4	1	6
J	3	4	0	1	0	1	0
K	3	4	0	0	3	3	1
B	2	5	0	0	0	0	0
C	2	5	0	0	0	0	0
Q	2	5	0	1	0	0	0
R	2	5	0	0	0	0	0
S	2	5	0	0	0	4	0
A	1	8	0	0	0	0	0
E	1	8	**	5	0	0	0
F	1	8	0	3	13	17	6
D	1	8	9	1	2	8	**

* Calculated according to definition of excess inventory from AR 30-1, Para. 3-43.

** Not available

Over 75% of the sites, or 10 out of 13, reported at least 1 month where the EOM inventory had an excess. In total, over 42% of the 61 months analyzed exhibited excess inventory. Of the 10 sites with excess inventory, 5 sites had excesses in only 1 or 2 months. However, the remaining 5 sites, that is sites H, K, B, F, and D, had excess inventories for at least 3 months. These excess inventories ranged from one to as many as 17 ration days -- more than half a month of excess rations on hand at the site.

A more in-depth analysis of these five sites furnished no consistent clue as to the causes of the excess inventories. Specifically, under the current Army food service system with standardized recipes and portion control, it would be expected that in any one accounting period food purchases that total less than earned allowances will require the manager to draw on his inventory. Conversely, food purchases greater than earned allowances in a particular month should add to inventories.

To check this premise, Table 11 was developed. The table presents the number of months that the 13 sites purchased issues over and under allowances and the changes in the inventory levels calculated as the difference between beginning and ending inventories in each month.

TABLE 11. Effects of Monthly Purchases on Changes in Inventory Levels

Purchases when account was:	Number of months in which inventory		Total
	Decreased	Increased	
Under-Allowance	11	12	23
Over-Allowance	17	21	38

As expected, the results for 32 months (11 + 21) were consistent with the premise that managers drew from inventory when food purchases were less than the earned allowance or that, conversely, food purchases greater than earned allowance in a month added to inventory levels. However, when purchases totaled less than cumulative allowances (Under-Allowances), inventory levels increased over 50% of the time -- in 12 out of 23 months. In addition, inventory levels fell in nearly 45% of the months, 17 out of 38, in which managers purchased more issues than allowances earned (Over-Allowances).

Conclusions. The above analysis and results appear to support the following conclusions.

1. Most small sites can be expected to incur at least 1 month of excess inventory every 6 months, because this was the case with over 75% of the sites.

2. In Europe, command emphasis on inventory management in food service operations appears to be minimal, as reflected by the five isolated sites that maintained excess inventories for three or more consecutive months. These five sites represented 3 different commands in Europe.

3. Excess inventory may result from a combination of reasons and not only from excess purchases above the earned allowances of a dining facility. A more detailed analysis furnished no consistent clues as to the cause of excess inventories.

Food Issue Utilization. According to AR 30-1, all enlisted personnel not receiving a Basic Allowance for Subsistence (BAS) are entitled to the Basic Daily Food Allowance (BDFA) for each day they are on active duty.

Because it would be unrealistic for a dining facility manager to provide meals that cost exactly the BDFA on a daily basis, the BDFA is computed only monthly. The dining facility manager then is able to offer a wider variety of menu items by offsetting high cost meals with low cost meals on subsequent days.

An analysis was conducted to determine the dollar value of issues utilized by a site during each accounting period. For the purpose of this analysis the costs associated with purchasing items in small quantities, food waste, and spoilage are assumed to be insignificant.

The technique implemented for this analysis is similar to the one utilized by most commercial restaurants in analyzing their financial status. In particular, a restaurant manager will compute the cost of food sold during a specified period of time by the following method:⁹

$$\text{Cost} = (\text{Purchased Food} + \text{Beginning Inventory}) - \text{Ending Inventory}$$

The manager will then subtract the cost of the food sold from the total sales for the period and determine the gross profits. From gross profits, operational expenses such as labor and utilities are subtracted to arrive at a pretax profit. This technique can be implemented for Army dining facility operation with only changes in nomenclature as given in Appendix E.

To compare the commercial accounting procedures to the Army dining facility methodology the following assumptions and definitions are introduced:

1. Data recorded on the Dining Facility Account Card, DA 3980-R, shown in Appendix A, are accurate and complete.

2. The cumulative allowance recorded on the last line in column h on DA 3980-R in any month includes a carryover from the

⁹ J. Keiser and E. Kallio, Controlling and Analyzing Cost in Food Service Operations, John Wiley & Sons, 1974. (pp 187-202)

previous month. This carryover is the debited cumulative value of the monetary status from all previous months of the current fiscal year. In order to obtain the value of the actual earned credits for the month, the previous month's monetary status will be credited to (subtracted from) the cumulative allowance recorded in column h. The resulting value is equivalent to sales for a commercial restaurant.

3. Gross profits (losses) represent the dollar value of in-month allowances earned over (under) the cost of utilized issues. However, since Army dining facilities do not operate for profit and current accounting methodology is concerned with the cost of issues over (under) the allowances earned (monetary status), to maintain consistency with Army accounting procedures, utilization variance will be defined as utilized issues less in-month allowances earned, which is gross profits times -1. From this point on, the term "variance" will be ascribed to this accounting definition rather than the statistical definition.

Using the definitions listed in Appendix E and the in-month data obtained from 15 dining facility accounts (See Appendix F), the utilization variance was calculated for 73 months of dining facility accounts and is presented in Table 12. Of the 15 dining facility accounts, 13 are small isolated or remote sites while the remaining 2, sites AA and AB, are large consolidated facilities feeding over 100 troops per meal. These latter two sites were inserted only for comparison. The utilization in Table 12 represents the amount over or under the earned in-month allowance utilized by the dining facility.

In examining all utilization variances, several points were noted. First, over 58% of the monthly utilization variances are negative, signifying that for a majority of the time the dining facilities are utilizing fewer issues than allowances earned. Second, several sites exhibited unusually large utilization variances, both positive and negative. For instance, site F in the third month utilized issues that were 71% of earned allowances while in the fifth month this site utilized issues amounting to 140% of earned allowances. Third, many sites are not consistent in their utilization of issues (in some months the variance is plus, in others minus) as demonstrated by sites B and C, as well as F). Fourth, the range (the difference between the highest positive and lowest negative value of utilization variances) was less than \$500 for six sites, between \$501 and \$1000 for two sites, between \$1,001 and \$2,000 for five sites and approximately \$2,700 and \$17,000 for the two large facilities, sites AA and AB respectively.

To further amplify these results, the portion of total in-month allowances per ration over/under utilized, (computed by dividing the utilization variance by the actual number of rations fed in one month), is presented in Table 13. Although it cannot be expected that the dining facility managers will feed all the troops to the exact allowance level, large variations from the ration allowance should not normally occur. Ten of the thirteen sites exhibited for at least 1 month over/under utilization of issues that amount to over 10% of their allowances.

TABLE 12. Utilization Data

Site	Month	In-Month Allowance	Utilized Issues	Utilization Variance
A	1	\$4,269.42	\$4,250.62	(\$ 18.80)
	2	4,023.74	3,996.98	(26.76)
	3	3,997.43	3,878.96	(118.47)
	4	3,627.46	3,577.30	(50.16)
	5	3,258.61	3,421.46	162.85
B	1	\$1,531.26	\$1,454.05	(\$ 77.21)
	2	1,583.95	1,457.62	(126.33)
	3	1,485.52	1,837.23	351.71
	4	1,242.56	1,233.87	(8.69)
	5	1,370.31	1,490.36	120.05
C	1	\$2,262.81	\$2,204.11	(\$ 58.70)
	2	2,103.10	2,272.08	168.98
	3	2,025.83	1,965.49	(60.34)
	4	2,344.20	2,416.14	71.94
	5	1,969.48	1,830.11	(139.37)
D	1	\$1,166.00	\$1,054.94	(\$111.06)
	2	1,498.90	1,951.09	452.19
	3	1,257.39	1,075.59	(181.80)
	4	1,090.67	876.62	(214.05)
E	1	\$1,630.33	\$1,397.61	(\$232.72)
	2	2,107.11	2,046.50	(60.61)
	3	1,893.72	1,826.15	(67.57)
F	1	\$2,143.21	\$1,832.32	(\$310.89)
	2	2,337.05	1,935.46	(401.59)
	3	2,187.64	1,559.92	(627.72)
	4	2,380.58	2,158.47	(222.11)
	5	1,870.46	2,619.35	748.89
G	1	\$3,476.73	\$3,935.95	\$459.22
	2	2,728.20	2,716.77	(11.43)
	3	3,189.24	2,602.73	(586.51)
H	1	\$4,813.37	\$4,464.08	(\$349.29)
	2	3,787.76	4,585.62	797.86
	3	4,189.92	3,472.80	(717.12)
	4	3,835.96	4,206.24	370.28
	5	3,631.39	2,984.70	(646.69)

TABLE 12. Utilization Data (cont.)

Site	Month	In-Month Allowance	Utilized Issues	Utilization Variance
J	1	\$2,722.09	\$2,692.10	(\$ 29.99)
	2	2,576.01	2,466.75	(109.26)
	3	2,739.38	3,017.06	277.68
	4	2,071.32	1,842.26	(299.06)
	5	1,996.10	2,116.87	120.77
K	1	\$4,689.92	\$4,733.75	\$ 43.83
	2	4,881.28	4,830.90	(50.38)
	3	3,946.18	3,784.29	(161.89)
	4	4,565.76	3,839.09	(726.67)
	5	4,347.55	4,775.74	428.19
Q	1	\$1,595.04	\$1,643.33	\$ 48.29
	2	1,158.86	1,003.43	(155.43)
	3	1,753.11	1,838.35	85.24
	4	1,125.00	1,222.90	97.90
	5	915.33	941.24	25.91
R	1	\$ 538.48	\$ 541.45	\$ 2.97
	2	570.83	541.82	(29.01)
	3	498.15	511.69	13.54
	4	477.51	463.18	(14.33)
	5	783.84	798.15	14.31
S	1	\$6,401.10	\$6,700.88	\$299.78
	2	4,726.60	4,984.18	257.58
	3	4,426.36	4,509.16	82.80
	4	4,712.11	4,355.22	(356.89)
	5	5,986.53	6,634.02	647.49
AA	1	11,778.95	14,190.16	\$2,411.21
	2	8,908.36	8,690.45	(217.91)
	3	11,717.32	11,933.72	216.40
	4	11,732.78	11,359.15	(373.63)
	5	10,845.68	11,047.20	201.52
AB	1	63,842.08	57,437.69	(\$6,404.39)
	2	63,201.36	61,058.02	(2,143.34)
	3	73,443.21	79,047.28	5,604.07
	4	66,286.50	66,140.36	(146.14)
	5	64,239.87	64,423.48	183.61
	6	68,103.15	67,004.02	(1,099.13)
	7	79,992.58	78,226.36	(1,766.22)

TABLE 13. \$/Ration Over- (Under-) Utilized

		Month				
Site		1	2	3	4	5
B	Allowed	\$4.48	\$4.48	\$4.46	\$4.40	\$4.43
	Utilized	(0.23)	(0.36)	(1.06)	(0.03)	0.39
A C D E F	Allowed	\$4.24	\$4.22	\$4.24	\$4.29	\$4.30
	Utilized	(0.02)	(0.03)	(0.12)	(0.06)	0.21
		(0.11)	0.36	0.12	0.13	0.30
		(0.39)	1.35	(0.63)	(0.84)	N/A
		N/A	N/A	(0.61)	(0.12)	(0.15)
		(0.66)	(0.78)	(1.23)	(0.48)	1.74
R	Allowed	\$3.96	\$3.96	\$3.96	\$3.92	\$3.84
	Utilized	0.02	(0.20)	0.11	(0.12)	0.07
S	Allowed	\$3.96	\$3.92	\$3.84	\$3.76	\$3.82
	Utilized	0.19	0.21	0.07	(0.28)	0.41
G H J K	Allowed	\$4.06	\$4.04	\$4.06	\$4.10	\$4.11
	Utilized	0.53	(0.02)	(0.74)	N/A	N/A
		(0.30)	0.87	(0.69)	0.39	(0.72)
		(0.06)	(0.18)	0.42	(0.45)	0.24
		0.03	(0.02)	(0.15)	(0.63)	0.39
Q	Allowed	\$3.78	\$3.76	\$3.75	\$3.67	\$3.67
	Utilized	0.11	(0.51)	0.18	0.28	0.39

Finally, the average percentage over or under the BDFA at which the managers are purchasing and utilizing issues to serve one ration was calculated for each month. These buying and utilization levels comprise the dining facility accounting operating level. (The simple algebraic manipulations utilized for this computation are based on those presented in Appendix E.) Tables 14 and 15 are the resulting monthly buying and utilization levels at each site and their year-to-date averages, rounded to the nearest 5%. Included for comparison are the allowances received by each site during the data collection period as well as the data for two large facilities.

TABLE 14. Percentage Over or Under the BDFA Purchased to Serve One Ration

Site	Allowance Received	MONTH							FY To Date
		1	2	3	4	5	6	7	
A	BDFA + 15%	15%	15%	15%	15%	15%	--	--	15%
B	BDFA + 15%	20	10	20	15	15	--	--	15
C	BDFA + 15%	10	20	15	15	10	--	--	15
D	BDFA + 15%	10	35	(5)	5	15	--	--	15
E	BDFA + 15%	--	--	(35)	5	10	--	--	5
F	BDFA + 15%	15	20	15	15	15	--	--	15
R	BDFA + 15%	15	20	10	25	10	--	--	15
S	BDFA + 15%	10	15	15	15	15	--	--	15
G	BDFA + 10%	10	10	5	--	--	--	--	10
H	BDFA + 10%	20	30	0	5	10	--	--	15
J	BDFA + 10%	10	10	10	5	10	--	--	10
K	BDFA + 10%	10	15	15	(10)	15	--	--	10
Q	BDFA + 10%	10	10	10	10	15	--	--	10
AA	BDFA Only	0	0	0	0	0	--	--	0
AB	BDFA Only	0	0	0	0	0	(5)	0	0

TABLE 15. Percentage Over or Under the BDFA Used to Serve One Ration

Site	Allowance Received	MONTH							FY To Date
		1	2	3	4	5	6	7	
A	BDFA + 15%	15%	15%	10%	15%	20%	--	--	15%
B	BDFA + 15%	10	5	40	15	25	--	--	20
C	BDFA + 15%	10	25	10	20	5	--	--	15
D	BDFA + 15%	5	50	0	(10)	--	--	--	15
E	BDFA + 15%	--	--	0	10	10	--	--	10
F	BDFA + 15%	0	(5)	(20)	5	60	--	--	5
R	BDFA + 15%	15	10	20	10	15	--	--	15
S	BDFA + 15%	20	20	15	5	25	--	--	20
G	BDFA + 10%	25	10	(10)	--	--	--	--	10
H	BDFA + 10%	0	35	(10)	20	(10)	--	--	5
J	BDFA + 10%	10	5	20	0	15	--	--	10
K	BDFA + 10%	10	10	5	(10)	20	--	--	10
Q	BDFA + 10%	15	(5)	15	20	15	--	--	10
AA	BDFA Only	20	0	0	(5)	0	--	--	5
AB	BDFA Only	(10)	(5)	10	0	0	5	(15)	(5)

EQUIPMENT

Results of the food service equipment surveys conducted at sites in Europe and Korea indicate that several problem areas exist, some of which are unique to these small remote and isolated sites and have been previously reported.¹⁰ These problem areas are related to the equipment itself, facility engineering, and transportation of perishables.

Food Service Equipment. Surveys were conducted to determine if the sites had the minimum equipment required for effective food service operations. Tables 16 and 17 list the equipment necessary and give the number of sites in Europe and Korea that have this equipment. The first five items listed are of a higher priority because they directly affect the recipe preparation stage of the food service operation. The remaining items that are important to a food service are assigned lower priority since they are either work-saving devices or needed from a customer-satisfaction point of view. (Equipment available at each site is listed in Appendix G.)

TABLE 16. List of Essential Equipment by Site Size (Europe)

ITEM	Satellite Facility			Dining Facility			
	Troop Strength			1-9	Troop Strength		
	20-29	30-39	40-49		10-19	20-29	30-39
Oven/Range/Stove	1	2	1	1	6	2	2
Refrigerator	1	2	1	1	6	1	2
Griddle	1	2	1	0	5	1	2
Deep Fat Fryer	1	2	1	1	4	2	1
Freezer	0	2	1	1	6	2	2
Coffee Maker	1	1	1	1	3	2	2
Beverage Dispenser	1	2	1	1	6	2	2
Milk Dispenser	1	2	1	1	4	1	1
Toaster	1	1	0	0	4	2	2
Ice Machine	0	1	0	1	6	2	2
Dishwasher	0	2	0	1	3	1	2
Steam Table	1	1	1	1	6	2	2
Number of Sites Surveyed	n=4				n=11		

¹⁰ Leo J. Harlow, Memorandum for Record, Report of Travel - Mr. Leo Harlow to Signal Command Remote Sites in Germany and Korea, 2-22 September 1977. 1 December 1977

TABLE 17. List of Essential Equipment by Site Size (Korea)

ITEM	Satellite Facility			Dining Facility			
	Troop Strength			Troop Strength			
	1-9	20-29	40-49	1-9	10-19	40-49	70-79
Oven/Range/Stove	2	1	1	1	1	1	1
Refrigerator	2	1	1	1	1	1	0
Griddle	1	1	0	0	1	1	1
Deep Fat Fryer	1	1	0	0	1	1	1
Freezer	2	1	1	1	1	1	1
Coffee Maker	1	1	0	0	1	1	1
Beverage Dispenser	0	1	1	0	0	1	0
Milk Dispenser	2	1	1	1	1	1	0
Toaster	2	1	0	1	1	1	1
Ice Machine	1	1	0	1	1	1	1
Dishwasher	0	0	0	1	1	1	1
Steam Table	0	1	0	0	0	1	1

Number of Sites Surveyed

n=4

n=4

Results summarized in Tables 16 and 17 indicate that several sites lack key equipment. A Korean site feeding 70-79 troops does not have a refrigerator. Three dining facilities in Europe, one in Korea, and one satellite facility in Korea do not have griddles. Although a unit feeding up to nine persons could adapt to using a kitchen without a griddle, units feeding larger populations would have difficulty preparing a standard A-ration menu without this item.

The lack of key equipment items may be due to one or more of the following factors. First, there is no Common Table of Allowance (CTA) that states the type of equipment authorized for units feeding fewer than 80 individuals. As shown earlier, the average headcount at these sites was 24 troops. In all but host nation support facilities, equipment purchases were often dictated by the CTA; thus, the items received were larger than the required capacity. Excess capacity places a higher demand on power, which may not be available at the sites or which may limit the use of other essential equipment.

Second, the site surveys also indicated a lack of standardization in the type of equipment provided. For example, in Europe, over four different American manufacturers of deep fat fryers were represented, requiring several different repair procedures for the same type of equipment and a large stockpile of spare parts. This same trend applies to other major equipment items and also occurs at the larger facilities: those feeding over 100 troops.

Third, the American equipment purchased for use in Europe by the military is often manufactured with electrical characteristics that are not compatible with the European 50-Hz electrical supply. Some American suppliers have furnished electrically operated food service equipment designed for 60-Hz motors with transformers intended to permit the equipment to operate at 50-Hz. This action results in a decrease in the life expectancy of the equipment due to early motor failure. This particular problem does not apply in Korea where the electrical current is the same as in the United States.

Facility Support. In Europe, eight facilities have a combination of American and foreign equipment, and seven had only American equipment. Maintenance and repair of all American manufactured equipment is the responsibility of the US Army area facility engineers. Usually the area facility engineer controls a work force which consists mainly of foreign nationals.

Table 18 shows that in Europe most host-nation sites receive almost immediate response to requests for equipment repair. Although response may be immediate because of the proximity of the host-nation military base, actual repairs may not be implemented for some time due to higher priorities, unavailability of parts, or lack of adequate funding.

TABLE 18. Facility Engineer Support

	KOREA	EUROPE
PERSONNEL	American, some national	1. American in charge of nationals 2. Contracts
RESPONSE TIME	2 Sites - same day 6 Sites - 2-3 days	<u>AMERICAN</u> 5 Sites - same day 10 SITES - 2 days to 1 month
		<u>HOST NATION</u> BRITISH - same day BELGIQUE - same day GERMAN - same day to 3 months ITALIAN - same day to 2 weeks
BASIS FOR DELAY	lack of personnel lack of spare parts distance	lack of personnel lack of spare parts lack of host-nation funding

Reaction time from the American facility engineer depends on priority and distance from the site. In most instances, the area American facility engineer is located at a major base some distance from the site. Response delays and incomplete work result from unavailable repair parts and equipment manuals, or language and technical barriers that exist when foreign nationals undertake equipment repairs.

In Korea, all food service operations use only American manufactured equipment. Due to the low priority assigned food service equipment in the military supply system in Korea, equipment has taken up to 1 year to arrive. Because of the delay in replacing equipment, many small sites procure the needed items through the Army Exchange System, which stocks many small (household size) items. From the exchange system, these items of equipment can be obtained within 1 month.

Facility Engineer response time for downed equipment in Korea typically varied according to the location of the sites. Unlike those in Europe, some sites in Korea are located in areas that are difficult to reach with ordinary transportation. These sites must often wait until the next scheduled transport return before repairs are attempted. Sites that have purchased equipment through the Army exchange system can easily obtain and install spare parts, thus minimizing downtime. However, those sites that have obtained equipment from the military supply system may lack spare parts and equipment manuals, which often must be ordered from the U.S., taking several months before receipt in Korea.

Transportation of Perishables. Problems in transporting perishables from the TISA to the user facilities appear to be much more significant in Korea than in Europe. Many Korean sites reported that when transporting perishables from the resupply point, it was common for frozen meals to thaw and for vegetables to be bruised. Poorly insulated containers, poor road conditions and the distances traveled caused the problems summarized in Table 19. Fresh food supplies may be transported in open pallets, cardboard boxes, or insulated metal containers. As Table 19 indicates, none of the containers perform adequately.

TABLE 19. Transport of Perishable Food Items (Korea)

Type of Container	Site	Capacity	Distance Transported	Mode of Transport	Problems
A. Insulated Metal Ice Chest	Q	200 lb	21 mi; 1½ h	2½-ton truck	1. Container is bulky 2. Can be dented from constant use
	R	200 lb	25 mi; 1-3/4 h	2½-ton truck	As above.
	S	200 lb & 400 lb	120 mi; 3½ h	2½-ton truck	As above. Also some thawing.
B. Cardboard Boxes	T	With ice	15 min	5-ton truck	1. Some thawing 2. Bruising of fresh vegetables and fruits 3. Problem with dust collecting on vegetables and fruits
	Y	No ice	1½ h	Helicopter	1. Thawing 2. Bruising
C. Open Pallets	W		3½ mi	2½-ton truck	1. Dust 2. Bruising
	X		16 mi; 30 min	2½-ton truck	1. Bruising 2. Thawing
D. Steam Table Pan covered with foil	V		2 mi	2½-ton truck	1. Bruising 2. Bulky
E. Blue Plastic Coolers	R		25 mi; 1-3/4 h	2½-ton truck	1. Item did not maintain cold temperature

Many of the insulated transporters and Temprite containers seen in Korea were dented and lacked the rubber seals required to maintain the temperatures of food. In addition, several of the down-range microwave units were inoperative. It was also noted that many of the containers were not preheated as required by standard operating procedures.

Conclusions. The results just presented support the following conclusions:

1. The equipment purchase policy used by many site managers may result from the fact that there is no prioritized schedule of essential equipment.

2. The CTA 50-909¹¹ authorizing equipment for military food service operations currently lists equipment that is too large for these small sites. TSA recognizes this problem and is planning to change CTA 50-909 to list equipment suitable for units feeding 40-80 troops. However, given that the average headcount for these sites is 24, it is unclear if this action will be sufficient.

3. The modification of American manufactured equipment for use in Europe, especially in ensuring conformance to the European electrical characteristics, is often not correctly and efficiently accomplished.

4. The facilities using host-nation equipment and support appear to have the least amount of equipment downtime.

5. The military supply system does not allow for the replacement of food service equipment in Europe or Korea and has not stocked a sufficient number of spare parts to repair the equipment in a timely manner.

6. The American facility engineers' response to requests from these small sites for equipment maintenance and repair is weak due to the site location and distances to be traveled.

7. In Europe, foreign nationals employed by the American area Facility Engineers are often unfamiliar with the technical aspects of the American manufactured equipment and do not follow effective repair procedures thus affecting the operation and usefulness of the equipment over time.

8. Higher priority requests frequently delay response for equipment repair to these small sites.

9. Current containers used to transport subsistence from the Class 1 supply point are inadequate to cope with the varying climatic conditions, distances, and rough terrain traveled in Europe and Korea.

10. The transporting of hot food to the down-range locations is inefficient and incorrect at many of these sites.

¹¹ CTA 50-909 "Field and Garrison Furnishing and Equipment", September 1983

Customer and Food Service Worker Opinion

At the 9 sites in Korea 27 customers and 7 cooks completed personnel-surveyed forms which solicited a rating of their satisfaction with their food service operation. In addition, 33 customers, 23 of which had completed the survey forms, and 12 cooks or cook substitutes (Korean cooks, site managers) were given an extensive face-to-face interview. In Europe, a total of 160 customers and 41 cooks from 16 sites completed the survey forms; however, no face-to-face interviews were conducted. The sixteenth site, site O, was not on the agenda for the site visits; however, due to its proximity to site P, the personnel survey data were collected, adding customer and cook opinions from an environment that was very similar to site P. Table 20 lists the number of personnel surveyed and interviewed at sites in both Korea and Europe.

TABLE 20. Number of Personnel Surveyed and Interviewed in Korea and Europe

	Site	Customers		Cooks	
		Survey	Interview	Survey	Interview
Korea	Q	4	4	0	1
	R	1	1	0	1*
	S	3	3	1	1
	T	3	3	0	1**
	U	2	2	1	1
	V	11	7	0	1
	W	0	6	0	1
	X	0	4	4	4
	Y	3	3	0	1**
Subtotal		27	33	6	12
Europe	A	0	8	0	4
	B	0	11	0	3
	C	0	11	0	2
	D	0	7	0	1
	E	0	11	0	1
	F	0	8	0	0
	G	0	12	0	2
	H	0	10	0	5
	I	0	2	0	2
	J	0	7	0	1
	K	0	15	0	3
	L	0	10	0	5
	M	0	13	0	3
	N	0	11	0	5
	O	0	12	0	3
	P	0	12	0	1
Subtotal			160		41

* Site Manager

** Korean National Cooks

Customer Opinion. Table 21 presents the results from customer surveys of their dining facilities showing an overall mean rating for each of the 7 Korean and 16 European facilities.

TABLE 21. Mean Customer Ratings of Different Food Service Operations

Site	Korea N	Mean	Site	Europe N	Mean
S	3	6.74	D	7	6.80
Q	4	6.69	I	2	6.69
U	2	6.00	A	8	6.48
T	3	5.99	B	11	6.34
Y	3	5.60	O	12	5.63
R	1	5.30	P	12	5.49
V	11	2.55	E	11	5.49
			F	8	5.46
			M	13	5.19
			G	12	4.79
			K	15	4.66
			C	11	4.52
			N	11	4.22
			H	10	4.11
			L	10	3.41
			J	7	2.93

Scale: 7 = Very Good; 4 = Neither Bad nor Good; 1 = Very Bad

The survey results displayed in Table 21 demonstrate more variability from site to site in the European customers' ratings than in those given by the Korean customers. Only one of the seven Korean facilities was rated below 5.00 (slightly good), and, as will be indicated in the interview data, the two other Korean facilities where customers were only interviewed were also rated highly. In contrast, 7 of the 16 European facilities were given mean ratings below 5.00. Furthermore, three Korean and four European facilities were rated at or above 6.00 (moderately good), and only one Korean and two European facilities were rated on the low side of the neutral. While customers in Europe were more critical of their isolated and remote dining facilities than were customers in Korea, at most of the sites in both locations there was no evidence of any major customer-oriented problem.

Table 22 exhibits differences between Korea and Europe with respect to specific customer complaints. These averages were also obtained from customer surveys pertaining to 13 specific aspects of foodservice at their site. Out of nine characteristics where there were mean response differences of at least 0.50 (half a scale point) between Korea and Europe, customers in Korea rated their facilities higher on eight. Only "chance to sit with friends" was given a higher rating by customers in Europe. In order of magnitude, customers at Korean sites were more

enthusiastic about the speed of service on lines, food quality, food variety at a given meal, general environment, food variety from day to day, food quantity, hours of operation, and cleanliness.

TABLE 22. Mean Customer Response Concerning 13 Aspects of the Food Service System

Factor	Korea (n=27)	Europe (n=160)
a. Speed of service or lines	6.35	4.98
b. Cleanliness	6.28	5.77
c. General environment	6.16	5.25
d. Food quality	5.83	4.82
e. Hours of operation	5.65	5.03
f. Attitude of civilian cooks	5.49	5.80
g. Food variety at given meal	5.47	4.51
h. Chance to sit with friends	5.46	6.18
i. Food quantity	5.43	4.72
j. Attitude of military cooks	5.35	4.91
k. Food variety from day to day	5.15	4.31
l. Military atmosphere	5.12	4.87
m. Monotony of same facility	4.39	4.44
Overall Mean	5.54	5.04

Scale: 7 = Very Good; 4 = Neither Bad Nor Good; 1 = Very Bad

The data presented also indicate no serious customer-oriented problems; no characteristic was rated below the neutral point (4.00). Of those characteristics receiving the lower customer ratings, two of them, monotony of the same facility and military atmosphere, are aspects which, given the isolated nature of these facilities, would be expected to be rated relatively low. If there is an addressable problem for both Europe and Korea reflected in these data, it is probably food variety from day to day. However, in Europe, other areas that may indicate potential problems are food variety at a given meal, food quantity, food quality, the attitude of the military cooks toward the customers, hours of operation, and customers having to wait in line.

The one-on-one interviews conducted at the Korean sites support the positive customer attitude reflected in the surveys. First, customers were asked what was good about their isolated site food service. Food quality was volunteered by 19 of the 33 (58%) customers interviewed. Fifteen of these customers (45% of the total 33) further stated that the food was better than that served at bigger, non-isolated dining facilities. Other responses given by more than 5 customers included not having to wait in long lines for food (24%), cooks being polite and courteous to customers (21%), and cooks preparing food the way the customers want it (18%).

The second customer interview question concerned what was bad about the dining facility. Only two answers were given by more than five customers, and for each of these, seven of the respondents were from site V. First, variety from day to day was cited as being bad by 6 additional customers from other facilities for a total of 13 (39%). The second answer, bad food quality was given only by the 7 customers (21% of the total) from site V. In summary, then, customers at site V were displeased about food quality and variety from day to day. There is the indication that if there is any customer problem at the Korean sites in general, it is variety from day to day.

The customers were asked how many meals a day they ate while on site. The vast majority (82%) reported eating 3 meals a day on site. Four customers (12%) said that whether on or off the site they typically ate two meals a day. One customer (3%) said he ate 3 meals a day when on duty, but skipped breakfast when he was off duty. One customer (3%) who was on separate rations estimated that he ate half his meals in the dining facility and half in his room or at the NCO Club.

When asked where they ate when not eating in the dining facility, most customers (58%) said nowhere -- there was nowhere to go. Most of those who reported eating away from the site reported eating in a club at one of the larger non-isolated bases either on weekends or when they were on pickup runs of one sort or another. Only 2 of the customers interviewed (6%) reported eating any meals on the Korean economy.

There were some notable differences in the responses by factor of the cooks between the two theaters. Perhaps the most striking appears to be a different view of the civilians working with them -- both cooks and KPs. On the three questions related to this issue (a, d, and f in Table 23), cooks in Korea gave ratings at least 1.25 scale points higher than cooks in Europe. The cooks in Korea also had a more positive view of customer satisfaction and of customer-food service worker relations. While responses from both locations indicated that equipment and utensil condition was a potential problem, it was viewed more seriously by the cooks in Europe. In addition, they were more negative about the maintenance of their equipment. The cooks in Korea were less positive about two aspects of the food service operation, the on-the-job training and the amount of support and cooperation among Army cooks.

TABLE 23. Mean Cook Response Concerning 17 Aspects
of the Food Service Operation

Factor	Korea (N=7)	Europe (N=41)
a. Food preparation skill of civilian cooks	7.00	5.39
b. Customer satisfaction	6.75	5.71
c. Food quality	6.69	6.61
d. Civilian food service workers (KPs)	6.67	5.41
e. Food variety at a given meal	6.56	6.36
f. Support and cooperation from Army and civilian cooks	6.50	5.26
g. Customer attitude toward cooks	6.50	5.12
h. The food preparation skills of Army cooks	6.25	5.89
i. Proper maintenance of equipment	6.13	5.31
j. Food variety from day to day	6.06	6.41
k. Leadership from shift leader	6.00	6.02
l. How long customers wait in line	5.75	6.22
m. Sanitary conditions	5.67	6.16
n. Leadership from food service sergeant	5.67	6.02
o. Condition of equipment and utensils	5.19	4.80
p. The on-the-job training program	5.00	5.75
q. Support and cooperation among Army cooks	5.00	5.61
Overall Means	6.56	6.08

Scale: 7 - Very Good; 4 - Neither Bad nor Good; 1 - Very Bad

One other result in Table 23 is of note: the cooks, particularly those in Europe, seem unconcerned about the variety of the food from day to day. This apparent lack of concern by the cooks is perhaps in itself grounds for concern when it is recalled that variety from day to day was one of the very few potential problem areas identified by customers.

The 12 interviews conducted with the cooks in Korea (including two Korean national cooks and one site supervisor who was acting as cook) substantiate a positive overall view of the food operation in the isolated and remote sites. They also, however, identified five potential problem areas.

The first, mentioned by 67% of the cooks, and particularly strongly by the cooks at the smaller sites, centered around the amount of paperwork required. According to these cooks, the paperwork was the same as for a much larger, non-isolated site. They felt that such detail was not necessary for a small operation, and that, since there was often only one Army cook present, the paperwork detracted from the time they could spend either cooking or monitoring the Korean nationals. A smaller number of cooks (42%) also pointed out an additional problem: there was no training provided in this paperwork for cooks newly assigned to the sites.

Of the 9 sites in Korea, 5 of them were quite small (21 or fewer personnel subsisting). Cooks from three of these sites reported that the issues received varied from those ordered, possibly indicating a lack of attention by TISA personnel to the issue request submitted. Cooks from four of these smaller sites indicated some difficulty with being issued items in quantities that were too large; for example, beef and canned goods.

Finally, 3 of the 12 cooks (25%) also commented about the problems of late night snack availability. Their remaining available at all hours is impractical, especially since many of these sites were understaffed. Problems of control and maintaining regulatory standards of sanitation would also exist if the men were allowed to prepare their own late meals.

Conclusions. Data summarized above support the following conclusions:

1. In general, there are no major problems perceived by customers or food service workers in isolated and remote sites in either Korea or Europe, although both customers and cooks in Europe tended to be more critical than those in Korea.

2. Food variety from day to day has been identified as a potential problem area.

3. While the cooks' attitudes were positive overall, they felt that the paperwork load was disproportionately heavy for small sites and, further, that cooks being assigned to isolated and remote sites should be trained in that paperwork. Small sites also reported problems in receiving excessive larger quantities of some items from the TISA. Late night snack availability was also mentioned as a problem.

V. CONCLUSIONS and RECOMMENDATIONS

The results of the surveys and analysis of foodservice at small isolated and remote sites in Europe and Korea might be summarized best by pointing out that there did not appear to be a consistent trend across all sites, commands, or countries. Despite problems at some sites in some areas, 60% to 90% of the food service operations in Korea and Europe, respectively, were rated very highly by their customers and cooks. Thus, a major conclusion of this analytical effort is that a new food service system is not required for small group feeding operations at permanent remote or isolated locations.

However, several characteristics of the current food service system can be addressed, redefined, and modified to resolve those problems that are specific to the site, command, or location. Recommendations for resolving many of these problems follow and are listed in the order of importance determined by the authors.

Operations Management

Because the current dining facility accounting system only controls and provides a measure of the dining facility manager's purchasing behavior, a new accounting system for Army small group dining facilities is recommended. The new accounting system would be designed to assist the command and the dining facility manager in meeting two major goals of the Army Food Service Program. The goals are: (a) to provide every active duty enlisted soldier his/her entitlement of food and (b) to meet the entitlement requirement in the most cost-effective manner.

1. Having concluded that the present method of accounting does not facilitate attaining the above objectives at all sites, it is recommended that:

- ° a new accounting system be developed.

The new accounting system specifically recommended is detailed in Appendix H. This system utilizes a modified design of the current Dining Facility Account Card, DA 3980-R, to provide immediate access to information required to meet the two major goals cited above. The managers will be able to determine the dollar value of food utilized to feed their customers and identify what more is required to provide the soldiers with their daily entitlement. The new system will also assist the managers in controlling their inventory as well as purchasing levels by identifying tolerance limits for their operations. In turn, the managers can fine-tune their operations to maintain cost-effectiveness.

2. In addition, it is recommended that:

- ° The end-of-month (EOM) inventories should be conducted by a disinterested officer or appointee of the commander under whom control

of the dining facility rests. This disinterested officer should have no official control over the dining facility. Although this is suggested in AR 30-1 it is not required and is not always followed. The purpose for this recommendation is to reduce the potential for conflict of interest in recording EOM inventory values.

3. Finally, it is recommended that:

° A consumption analysis, as utilized by commercial restaurants, should be implemented periodically during the month by the dining facility managers to increase their awareness of daily operations. A consumption analysis provides the managers with information on how well they are meeting their goals throughout the month. The technique for conducting a consumption analysis is detailed in Part 3 of Appendix H and utilizes the new accounting system.

Equipment

Since there are some sites at which equipment is either inadequate or inoperable, the following recommendations are offered.

1. All future purchases and replacements of food service equipment at the small isolated and remote sites should be based on the following equipment list:

Preparatory
Oven/Range
Refrigerator
Freezer
Griddle
Fryer

Ancillary Support
Milk Dispenser
Beverage Dispenser
Coffee Maker
Toaster
Serving Line
Dishwasher
Ice Machine

The priority order of the equipment purchases should be to first ensure that all preparatory equipment required is available and then to secure the ancillary support -- customer-oriented and work-saving equipment. The number of personnel stationed at a site would govern the capacity and type of equipment needed.

2. Prior to equipment purchases, the food service adviser, or the FMAT should conduct an equipment survey at the site. This survey should encompass the unit's mission, population, and facilities available in order to identify essential items of food service equipment required. Equipment selection should be based on the above list while minimizing physical modifications to the dining facility.

3. The purchase of non-American food service equipment is recommended for the small remote and isolated sites in Europe. There are many reputable food service equipment manufacturers in Europe who have representatives located throughout Germany, Italy, and Greece. By

purchasing foreign equipment, several equipment and facility support problems will be resolved. Specifically, early electrical motor failures and gas equipment problems will be eliminated by the use of host nation equipment. Repair of the equipment will be facilitated and spare parts will be more readily available since the manufacturers or their representatives will be within proximity of these sites.

4. Purchase of compact equipment is recommended for all small OCONUS sites, especially in Korea, that normally purchase American-manufactured items. A wide selection of American-made small modular food service equipment is available from several reputable manufacturers, which would meet the requirements of the small population fed. Fig. 6 illustrates the use of such equipment, which was tested at the Madison Site in Korea. A more detailed description of this equipment by one manufacturer is provided in Appendix I.

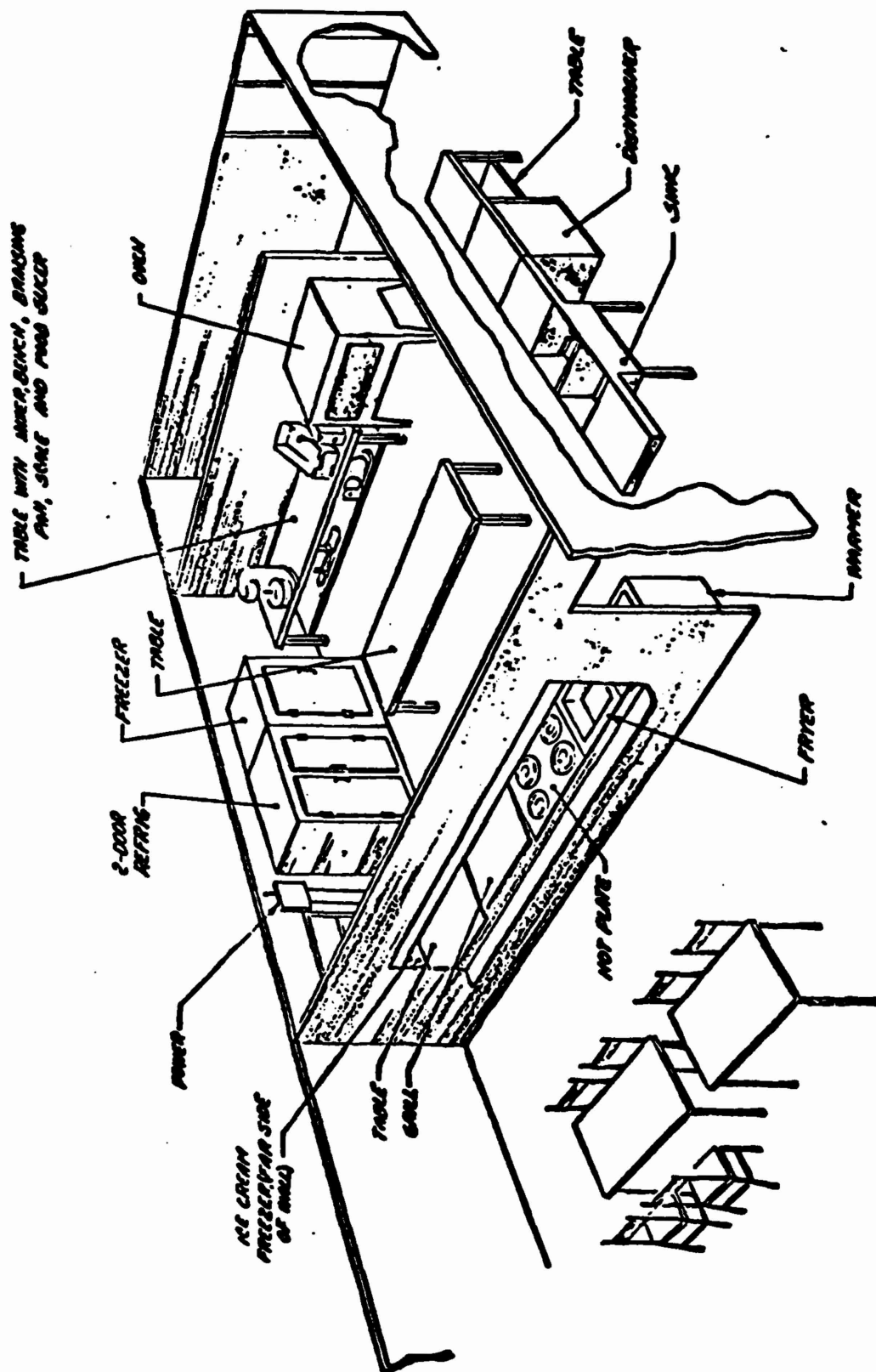


FIGURE 6. Proposed kitchen for Madison.

5. The delivery of finished food products can best be accomplished using the commercial insulated containers described in Appendix J. All of these containers have been utilized in the U.S. in the civilian sector with success for delivery of hot meals to distant locations. Thus they are aptly suited for downrange feeding of troops. The type and size selected by these sites will be dependent on market availability and the size of the contingent of troops to be fed at these remote locations. All the insulated containers will require that the dining facility manager ensure that the food is at a proper temperature to compensate for the distance it has to travel when used for downrange feeding.

6. The insulated containers described in Appendix J are also suited for the transport of subsistence items from the TISA to the small isolated and remote sites. The Amoco unit, specified in Appendix J, has been tested at various remote sites in both Europe and Korea with favorable results. These containers are small enough to be handled by one person, and thus meet the needs of the smaller sites. Additional containers would satisfy the requirements of the larger sites.

Staffing

1. The rank of food service managers at all dining facilities should, at a minimum, be at the E-5 level for facilities serving populations of 10 or less and E-6 level for larger facilities, as suggested by DA PAM 570-55. These recommended levels of management are particularly needed at the sites in Korea, where rank of personnel in charge was as low as E-2.

2. It is recommended that minimum staffing levels be determined in accordance with AR 30-1. For dining facilities operating on a permanent basis DA PAM 570-55 is recommended for establishing staffing levels, and for field or temporary operations AR 570-2, "Organization and Equipment Authorization Tables - Personnel,"¹² is recommended in AR 30-1. Both staffing guides list a minimum of two cooks per food service operation regardless of headcount. This recommendation applies not only to dining facilities but also to satellite facilities.

3. Contingency plans should be formulated at each site in the eventuality that the food service manager is removed. Specifically, during the survey period, nearly half the food service managers in Europe were on Temporary Duty Assignment to the U.S. In all cases the managers were not replaced, and the most senior cook available had to manage operations short-handed and often without experience or detailed instructions. It is recommended that at least one additional individual, preferably a cook, be trained by the food service sergeant in the management of daily operations at the dining facility. Furthermore, TDY assignments for training at the QMS at Ft. Lee should be scheduled between permanent assignments, especially for food service sergeants.

¹² AR 570-2 "Manpower and Equipment Control", HQDA. 22 July 1969

Administration

1. Additional training requirements should be identified and provided to those food service personnel assigned to isolated and remote sites. Of those managers having difficulties with their food service operations, most were first-term enlistees with little or no on-the-job or formal training. In some instances, these individuals were detailed to assume the manager's position due to unforeseen events, and had to operate short-handed under an unfamiliar system. This additional training should be provided to all personnel to be assigned to small group feeding operations and should include an introduction to AR 30-1 and AR 30-18, the planning for and preparation of all administrative forms required for food service operations, inventory management issue utilization, and account maintenance.

2. The cook's worksheets, DA 3034, should be eliminated as a requirement for food service operations staffed by three cooks or less.

3. Several changes to the regulation on "The Army Food Service Program", AR 30-1, in format and organization for greater clarity for food service personnel are recommended. In particular,

a. Fiscal accountability for small satellite facilities should be specified. Three rules should be included in these accountability measures.

(1) A minimum of documentation should be required. The documentation should include the signature headcount forms, intra-facility issue request form, and, if required, the cooks' worksheets. A separate file should be maintained at the main dining facility for these completed forms for the period of time specified in AR 30-1 for the larger facilities.

(2) Food service personnel in charge of these facilities should be allowed, as much as possible, to order issues in line with customer preference, rather than be forced to accept issues based on the discretion of the controlling dining facility.

(3) Because most small dining facilities are provided with a supplemental allowance over the BDFA, an additional allowance should be provided for the satellite facilities to ease the managers' difficulties in satisfying customer preferences. In most cases, the additional cost incurred at the small satellite facilities can be absorbed by the controlling dining facility, which has a larger headcount base.

b. Specific guidelines for remedial actions to be taken on out-of-tolerance accounts should be prepared. These guidelines should include requirements for: reviewing inventory status, implementing both beginning and ending inventories, and counseling in inventory management; more emphasis on monthly rather than fiscal year accountability; conducting frequent consumption analyses, as discussed

in previous recommendations; reviewing food preparation operations including techniques used for reducing waste, such as polling customers to more accurately determine quantities of food required for a given meal.

c. Reduce the administrative requirements for furnishing night meals, especially for those sites with an active 24-hour mission. Specifically, managers have pointed to para. 3-91 of AR 30-1 titled "Night Meals," subpara. F, which calls for the authorization and implementation of a special meal card to restrict access to the night meal, and which creates such an administrative burden that these meals are seldom offered. In some cases, because of distance and transportation available, the food service sergeants could not return the special cards to the issuing headquarters by the next morning as required by this regulation. It is therefore recommended that special rules be established for small, isolated, and remote sites to facilitate provision of night meals.

d. Installation commanders or site commanders should provide written justifications for reducing the 90-minute meal service period specified in AR 30-1.

4. A special section should be included in AR 30-18, "Army Troop Issue Subsistence Activity Operating Procedures," for small, isolated dining facilities feeding fewer than 100 troops. This special section should attempt to reduce numerous inconsistencies in operating policies from TISA to TISA that create hardships on certain small sites. Specifically, this section should:

a. Waive restrictive suspense dates on issue ordering forms, DA 3161 or DA 3094-R, which, because of distance and transportation available from site to TISA, are extremely difficult to meet.

b. Place stronger emphasis on reconciliation of account cards (DA 3980-R) three times per month as already specified in AR 30-18.

c. Allow no food item price changes during the monthly accounting period as currently required but not always followed.

d. Permit supply of meat items in less than case lots to small site, food service managers, if requested.

e. Schedule reasonable time periods for issue pickup at the TISA or establish schedules of ordering such that small-site managers have access to the same variety of food items at the TISA as do the larger and less distant dining facilities.

Menus and Recipes

1. A follow-on effort should be initiated to develop special, scaled editions of the current recipe cards, TM 10-412, that will contain recipe formulations for quantity cooking for fewer than 100 troops. Recommended batch sizes for these recipe formulations, based on the population range of the sites surveyed, are for 10, 25, and 50 servings.

2. In addition, the recipe formulations in the two or three most used cookbooks at these sites, such as the Betty Crocker Cookbook, should be analyzed using Army cost and nutrition standards. Those recipes found to meet Army standards would be authorized by TSA for interim use at these small facilities. These recipes can be utilized until the smaller quantity recipe cards (for 10, 25, and 50 servings) are available, and would thereafter offer alternative recipe formulations for greater variety to the troops.

Conclusions. The principal conclusions drawn from the above results are as follows:

1. Dining facility managers generally purchase issues within regulated limits. Table 14 demonstrates that although some variability in purchases occur from month to month, this variability in buying levels is small where over 86% of the months indicate purchases to within $\pm 5\%$ of the allowance earned. In fact, in the long run only two of the sites were outside the FY-to-date limits.

2. Dining facility managers are not providing every active duty soldier the entitlement of the BDFA plus supplemental allowance in rations dictated by AR 30-1 each month. The variability from month to month is clearly demonstrated in Table 13, where managers utilize issues more than $\pm 10\%$ of earned allowances for almost 53% of the months, that is, 38 out of 72 months. Although providing the BDFA in rations on a day-to-day basis is unrealistic, the cost of an average ration should approach the manager's allowances during a 30-day period.

3. The active duty soldiers are receiving less than their entitlements in rations more often than they receive more. For over 44% of the months analyzed, the dining facility managers were utilizing issues well below allowances earned.

4. The supplemental allowance for most sites appears arbitrary. Since it has been demonstrated that most site managers will purchase more issues than the credits they earn the majority of the time, it is most likely that dining facility managers at these sites are gearing their buying levels to the supplemental allowance, rather than the reverse. For example, the supplemental allowances for sites G, H, J, and K were increased from 10% to 15% in the sixth month, although the year-to-date buying and utilization levels at these sites for the most part were at the BDFA $\pm 10\%$ levels.

5. The combination of purchasing issues at levels above earned credits and the underutilization of these issues can only lead to a continuous problem of excess inventories, spoilage, and waste as discussed earlier.

6. Large dining facility operations appear to suffer the same type of problems as small sites.

This document reports research undertaken at the US Army Natick Research and Development CENTER and has been assigned No. NATICK/TR-85/063 in the series of reports approved for publication.

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LIST OF ACRONYMS

ARCS	Army Ration Credit System
BAS	Basic Allowance for Subsistence
BDFA	Basic Daily Food Allowance
CTA	Common Table of Allowances
DA	Department of the Army
DFAE	Directorate of Facilities and Engineering
EOM	End of Month
FMAT	Food Management Assistance Team
FRIS	Food Ration Issue System
MACOM	Major Command
MARS	Monetary Allowance Ration System
NSN	National Stock Number
POL	Petroleum, Oil and Lubricants
QMS	Quartermaster School
RIK	Rations in Kind
SP	Supply Point
TISA	Troop Issue Support Activity
TISO	Troop Issue Supply Offices
TSA	Troop Support Agency
USAREUR	U.S. Army Europe

APPENDICES

- APPENDIX A. Operations Survey Forms
- APPENDIX B. Equipment Survey Forms
- APPENDIX C. Customer and Worker Survey Forms
- APPENDIX D. Methodology for Calculating Ration Days
- APPENDIX E. Algebraic Determination of Operating Levels
- APPENDIX F. Monthly Accounting Data
- APPENDIX G. Food Service Equipment Available by Site
- APPENDIX H. New Accounting System
- APPENDIX I. Small Modular Equipment
- APPENDIX J. Amoco Insulated Container

APPENDIX A
Operations Survey Forms

OPERATIONS SURVEY FORMS

NAME: SITE
LOCATION:
UNITS ASSIGNED:
MISSIONS:
REMOTE: ISOLATED:
DESCRIPTION OF TERRAIN TO SITE:

NEAREST LARGE CITY NEAREST AMERICAN FORCES
NAME: NAME:
DISTANCE: DISTANCE:

CURRENT # OF TROOPS STATIONED HERE:
IN PAST YEAR MAX POP: MIN POP:
WHY CHANGE IF SIGNIFICANT?
AVERAGE LENGTH OF TOUR:
MAX LENGTH:
MIN LENGTH:

TROOPS LIVING AT SITE:
LIVING AT NEARBY BASE: NAME OF BASE:
DIST FROM SITE:
MODE OF TRANSP LIVING IN NEARBY:
TOWNS:
NAME OF TOWNS:
DIST FROM SITE:
MODE OF TRANS:
OTHER:

TROOPS AUTHORIZED TO EAT AT DF:

OF TROOPS ON RIK:

OF TROOPS ON SEPARATE RATIONS:

IF APPLICABLE

LOCATIONS DOWNRANGE:

TROOPS PER DR SITE:

DAYS DOWNRANGE SITES OP:

COMPOSITION OF OTHER THAN ARMY PERSONNEL

AMERICAN FORCES:

SERVICE	LIVING QTRS	POP	AUTHORIZED IN DF
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ALLIED FORCES:

COUNTRY	LIVING QTRS	POP	AUTHORIZED IN DF
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CIVILIANS: (INCLUDE AMERICANS)

COUNTRY	LIVING QTRS	POP	AUTHORIZED IN DF
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ADMINISTRATIVE

DINING FACILITY HOURS OF OPERATION: WEEKDAY WEEKEND

MEAL SERVING PERIODS BREAKFAST

LUNCH

DINNER

OTHER (SPECIFY)

DUE TO UNIT MISSION HOW OFTEN ARE UNSCHEDULED MEALS PREPARED?

WHO PREPARES MEAL?

DO PATRONS HAVE ACCESS TO KITCHEN?

WHEN?

ARE ADMIN & ACC'T FORMS CONSOLIDATED WITH OTHER DF?

IF YES, NAME & LOCATION OF DF:

IS THIS FACILITY THE ADMIN AND ACC'T CENTER FOR OTHER SITES?

IF YES	NAME	LOCATION	TYPE
--------	------	----------	------

AVERAGE CASH COLLECTED AT SITE: BY DAY

BY WEEK

MAX AM'T CASH HELD AT FACILITY BEFORE TURN-IN:

WHO PERFORMS DF CLERK FUNCTION?

COMPLETE THE DINING FACILITY FORMS WORKSHEET TO INCLUDE FORMS USED TO
RECORD THE FOLLOWING:

HEADCOUNTS BOTH CAS AND RIK - INCLUDING

- A) DA FORM 3033 - HEADCOUNT RECORD
- B) DA FORM 3351 - SIGNATURE HC SHEET
- C) DA FORM 1544 - CASH MEAL PAYMENT SHEETS
- D) DA FORM 3032 - DF MEAL REGISTER

ISSUES & RECIEPTS - INCLUDING

- A) ARMY TISA
- B) AF TISA - AF 287 SUSBSISTANCE REQUEST
- C) LOCAL PURCHASE

DF ACCOUNTING - INCLUDING

- A) DA FORM 3980-R (IF STILL EXISTTS) (ACCOUNT CARDS)
- B) DA FORM 2970 - SUBSISTENCE REPORT & FIELD RATION
REQUEST
- C) DA FORM 3234-R - INVENTORY RECORDS

EQUIPMENT REQUESTS & REPAIRS - INCLUDING

SF 368 - REPORTING QUALITY OF DEFICIENCY DATA

- ANY OTHERS THAT MAY ARISE
- FOR COMMENTS REVIEW SEVERAL EXAMPLES AND NOTE TRENDS,
AND STRANGE ENTRIES

COLLECT DINING FACILITY ACCOUNT CARD DATA FOR 6 MONTHS USING FORM
PROVIDED (IF APPLICABLE)

COMPLETE HEADCOUNT TALLY SHEET FOR A 1 MONTH PERIOD USING EITHER DA
FORM 3033 OR THE FOLLOWING:

DA FORMS 3351

3032

Dining Facility Forms

[illegible]

* enter any data pertinent to determine degree of completions, repetitiveness, etc.

OF ACCOUNT CARD (DA FORM 3980-R)

SITE NAME _____	LOCATION _____	SITE _____
-----------------	----------------	------------

[illegible]

HEADCOUNT TALLY

SITE NAME _____ LOCATION _____ UNIT _____

DATE	MEAL	RIK	CASH	OTHER	MEAL TOTAL	DAILY TOTAL	CUMULATIVE TOTAL
	BREAK						
	LUNCH						
	DINNER						
	OTHER						
	BREAK						
	LUNCH						
	DINNER						
	OTHER						
	BREAK						
	LUNCH						
	DINNER						
	OTHER						
	BREAK						
	LUNCH						
	DINNER						
	OTHER						
	BREAK						
	LUNCH						
	DINNER						
	OTHER						
	BREAK						
	LUNCH						
	DINNER						
	OTHER						

FOOD

MENUS

- A. HOW COMPLETE ARE COOK'S WORKSHEETS? (NOTE COLUMNS COMPLETED)
HOW FAR IN ADVANCE ARE THEY PREPARED?
- B. WHEN CIVILIANS ARE COOKING, DO THEY FOLLOW COOK'S WORKSHEETS,
AND IF NOT, WHY NOT?
- C. OBTAIN COPIES OF, OR MAKE A COPY OF THE MENUS OFFERED FOR ONE
MONTH (COOK'S WORKSHEETS OR PUBLISHED MENUS).
- D. HOW ARE MENUS DETERMINED? EXPLAIN.
(42-DAY CYCLE MENU, PATRON PREFERENCE)
- E. HOW ARE A RATION RECIPES FORMULATED?
 - 1. ADHERE TO ARMED FORCES RECIPE CARD
METHOD USED FOR FORMULATION FOR SMALL VOLUME FEEDING:
 - 2. SMALL VOLUME COOKBOOK
TITLE _____ AUTHOR _____
 - 3. COOK'S EXPERIENCE
 - 4. OTHER (SPECIFY)

SNACKING FACILITIES NEARBY:

RATION MIX

% MIX OF RATIONS SERVED

FOR REMOTE SITES

RATION

% MIX

WHERE PREPARED

A

B

C

MRE

MCI

OTHERS:
(SPECIFY)

TRANSPORT OF HOT FOOD TO REMOTE SITES

A. MODE OF TRANSPORTATION (TRUCK, JEEP, ETC.):

B. DISTANCE FROM DF TO REMOTE SITES:

C. APPROXIMATE TIME OF TRAVEL TO REMOTE SITES:

D. TYPE OF CONTAINERS USED TO TRANSPORT HOT FOOD:

HOW AND WHERE PURCHASED:

CONDITIONS OF CONTAINERS: (INCLUDE INSERTS IF USED)

E. APPROXIMATE TIME FROM WHICH HOT FOOD REACHES SITE AND LAST
PERSON CONSUMES THE FOOD:

FOOD: SOURCE OF SUPPLY

- A. COMPLETE SOURCE OF SUPPLY FROM:
- B. DFM'S ESTIMATE OF QUALITY OF INGREDIENTS FROM EACH SOURCE:
- C. IF REMOTE SITE, OR SERVICE DOWN RANGE SITES
 - a. PROBLEMS WITH TRANSPORT OF FOOD TO SITES:
(WEATHER, ROADS, ALERTS, ETC.)
 - b. TO COUNTERACT THESE PROBLEMS, IF ANY EXIST, WHAT QUANTITY
OF STOCK IN HAND BY TYPE OF RATION (QUANTITY = # OF DAYS)
 - c. HOW OFTEN THESE PROBLEMS OCCUR:
- D. IF ISOLATED SITE
 - a. PROBLEMS WITH TRANSPORT OF FOOD TO SITES:
(WEATHER, ROADS, ALERTS, VISITS BY UNAUTHORIZED PERSONNEL,
ETC.)
 - b. STOCKS ON HAND (# OF DAYS) AND TYPE:
 - c. HOW OFTEN THESE PROBLEMS OCCUR:
- E. RATION BREAKDOWN
 - a. DOES ARMY TISA BREAK DOWN RATIONS TO FIT UNIT SIZE AT
SITE?
 - b. DOES AF TISA BREAK DOWN RATIONS?
 - c. OTHER SOURCES OF SUPPLIES BREAKDOWN OF RATIONS:

FOOD: COSTS

A. BDFA & SUBSISTENCE ALLOWANCE

B. EFFECTS ON COSTS BY SUPPLY SOURCE:

- a. EXCESS COSTS ACCOUNTABLE BY RATION MIX:
- b. EXCESS COSTS DUE TO SUPPLY SOURCE:
- c. ACCOUNTABILITY TO SUPPLY SOURCES OTHER THAN ARMY TISA:
- d. ACCOUNTABILITY TO HIGHER HQ FOR OTHER THAN ARMY TISA
(ARE IMPREST FUNDS USED? EXPLAIN):
- e. FOR LOCAL PURCHASES, ETC., WHAT EFFECT DOES MONEY EXCHANGE
RATE HAVE ON COST? (DOES LOCAL FINANCE OFFICE USE A
YEARLY RATE, ETC):

C. EFFECTS OF COST ON QUALITY OF RAW INGREDIENTS (ARE CHEAPER
CUTS OF MEAT USED TO REDUCE COSTS IN LOCAL PURCHASES?):

D. ARE NATIONALS FED AT SITE?

IF YES

MILITARY

CIVILIAN

WHO PAYS

HOW OFTEN

HOW ACCOUNTED

JOB

EFFECTS OF FEEDING NATIONALS ON DF ACCOUNT:

Site Name _____ Location _____ Unit _____

Source of Supply

		Army TISA	Army Commissary	AF	Local	Other (specify)
Food Related Items	1. % of total supplies					
	2. Location					
	3. Distance to site					
	4. Mode of transport of supplies					
	4a. Perishables					
	4b. Non- perishables					
	5. Schedule of resupply					
	6. Problems of resupply					
	6a. Weather					
	6b. Supplier's restrictions					
	6c. Terrain					
	7. NIS Problems					
	8. Effect on costs					

		Army TISA	Army Commissary	AF	Local	Other (specify)
Non-Food Items Cleaning Solvents	Supplies Location & %					
	Resupply schedule					
	NIS					

APPENDIX B
Equipment Survey Forms

EQUIPMENT AND SUPPORT

PREPARE A CURSORY DRAWING (APPROXIMATE MEASUREMENTS) OF THE FOLLOWING:

- A. LOCATION OF DF IN REFERENCE TO MISSION ACTIVITIES AND LIVING QUARTERS

- B. ENTIRE DF AREA
 - a. FOOD PREP AREA WITH MAJOR EQUIPMENT
 - b. EATING AREA WITH TABLES/CHAIRS, COUNTERS, & ACCESS TO FOOD
 - c. ACCESS TO EATING AREA
- C. TAKE SLIDES OF SAME (IF CAMERA AVAILABLE)

COMPLETE BOTH THE CURRENT MAJOR AND THE MINOR EQUIPMENT FORMS

MAJOR EQUIPMENT: OVENS, STEAM KETTLES, REEFERS, ETC.

MINOR EQUIPMENT: COFFEE MAKER, TOASTER, POTS, PANS

PROCUREMENT POLICY FOR MAJOR/MINOR EQUIPMENT:
(INCLUDE ADMIN PROCEDURES, FUNDING ALLOWANCE, ETC.)

MISSING EQUIPMENT: DF'S OR COOK'S OPINIONS
DATA COLLECTOR'S OPINIONS
NOTE IF ON ORDER AND HOW LONG WAITING, ETC.

WAREWASHING OPERATION

PROCEDURE

EQUIPMENT

PROBLEMS: (INCLUDE HOT WATER AVAILABILITY AND/OR DISINFECTANT
CHEMICALS)

OVERALL MAINTENANCE AND REPAIR SUPPORT RESPONSE (OF EQUIPMENT)

UNIT RESPONSIBLE:

REPORTING PROCEDURE:

AVERAGE RESPONSE TIME:

RUBBISH DISPOSAL PROCEDURE

ELECTRICAL

MAIN SUPPLIER:

MAX KW AVAILABLE (IF KNOWN):

PROBLEMS: INCLUDE ELECTRICAL CYCLE PROBLEMS ON EQUIPMENT
BROWN OUTS (# OF TIMES OCCUR)
BLACK OUTS (# OF TIMES OCCUR)

ALTERNATE SOURCE OF SUPPLY WHEN MAIN SOURCE IS DOWN:
(INCLUDE CONSTRAINTS ON USAGE)

LIQUID FUELS (GASOLINE, DIESEL, ETC.)

TYPES AVAILABLE & SOURCE (INCLUDE RELIABILITY).

PROBLEMS IN USAGE DUE TO LOCATION, STORAGE:

WATER SUPPORT

SOURCE:

AVAILABILITY:

PROBLEMS (IF ANY) WITH POTABILITY:

IS A WATER TESTING KIT USED?

CHEMICALS AVAILABLE FOR DECONTAMINATION:

IF NONE AVAILABLE, GIVE REASON:

HOT WATER AVAILABILITY:

CHECK HOT WATER UNIT FOR TYPE, POWER SOURCE, CAPACITY, AND
OPERATIONAL RELIABILITY:

[illegible]

Minor Items of Equipment (Cooking)

Site Name: _____ Location: _____ Unit: _____

[illegible]

APPENDIX C

Customer and Worker Survey Forms

Isolated Duty Customer Interview

1. In your opinion, what is good about food service at this site?
2. In your opinion, what is bad or needs improvement in food service at this site?
3. How many meals do you eat here at this site?
4. Where do you eat when you don't eat at the site dining facility?
5. Why do you eat at _____ rather than the site dining facility?

ISOLATED DUTY CUSTOMER SURVEY

HOW WOULD YOU DESCRIBE YOUR SITE DINING AREA? FOR EACH AREA INDICATE YOUR OPINION OF YOUR DINING FACILITY BY CIRCLING A NUMBER.

	VERY BAD	MODER- ATELY BAD	SLIGHT- LY BAD	NEITHER BAD NOR GOOD	SLIGHT- LY GOOD	MODER- ATELY GOOD	VERY GOOD
a. General environment	1	2	3	4	5	6	7
b. Degree of military atmosphere present	1	2	3	4	5	6	7
c. Chance to sit with friends	1	2	3	4	5	6	7
d. Cleanliness	1	2	3	4	5	6	7
e. Hours of operation	1	2	3	4	5	6	7
f. Monotony of same facility	1	2	3	4	5	6	7
g. Quality of food	1	2	3	4	5	6	7
h. Quantity of food	1	2	3	4	5	6	7
i. Attitude of military food service personnel	1	2	3	4	5	6	7
j. Attitude of civilian food service personnel	1	2	3	4	5	6	7
k. Variety of food at a given meal	1	2	3	4	5	6	7
l. Variety of food from day to day	1	2	3	4	5	6	7
m. Speed of service or lines	1	2	3	4	5	6	7

ISOLATED DUTY COOK INTERVIEW

1. What are your daily duty hours?
2. What days do you have off?
3. In your opinion, what is good about the food service operation at this site?
4. In your opinion, what is bad or needs improvement in the food service operation at this site?
5. Do you need to replace any equipment or need any additional equipment for the dining facility?
6. Do you have any support problems with either water or power?
7. Do you have any non-food service related duties? If so, what and how often?

ISOLATED DUTY COOK SURVEY

1. Please write in the number of your present grade. E- _____
2. How long have you been at this site?
3. How would you describe your present job in food service?
4. What are your feelings about the military service? (Circle one number)

DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE A LITTLE	NEUTRAL	LIKE A LITTLE	LIKE MODERATELY	LIKE VERY MUCH
1	2	3	4	5	6	7

5. We would like you to rate each factor below on how good or bad each actually is in terms of the present food service operation. Please use the following scale.

VERY BAD	MODER- ATELY BAD	SLIGHT- LY BAD	NEITHER BAD NOR GOOD	SLIGHT- LY GOOD	MODER- ATELY GOOD	VERY GOOD
1	2	3	4	5	6	7

Please circle a number for each factor (keeping in mind you are now rating how good or bad each factor is in your dining facility).

a. The condition of equipment and utensils	1	2	3	4	5	6	7
b. Sanitary condition in the kitchen and dining area	1	2	3	4	5	6	7
c. The food preparation skills of Army cooks	1	2	3	4	5	6	7
d. The food preparation skills of civilian cooks	1	2	3	4	5	6	7
e. Leadership from your food service SGT	1	2	3	4	5	6	7
f. Leadership from your shift leader	1	2	3	4	5	6	7
g. Support and cooperation among Army cooks	1	2	3	4	5	6	7
h. Support and cooperation from Army and civilian cooks	1	2	3	4	5	6	7
i. Civilian food service workers (KPs)	1	2	3	4	5	6	7
j. Customer satisfaction	1	2	3	4	5	6	7
k. Customer attitude toward cooks	1	2	3	4	5	6	7
l. How long the customer has to wait in line	1	2	3	4	5	6	7
m. Food quality	1	2	3	4	5	6	7
n. Food variety at a given meal	1	2	3	4	5	6	7
o. Food variety from day to day	1	2	3	4	5	6	7
p. The On-The-Job Training (OJT) program	1	2	3	4	5	6	7
q. Proper maintenance of equipment	1	2	3	4	5	6	7
r. The dining facility OVERALL	1	2	3	4	5	6	7

6. How would you rate this dining facility in comparison to ALL other dining facilities in which you have worked? (Circle one number)

This facility is:

THIS IS MY FIRST DINING FACILITY	MUCH WORSE	SOMEWHAT WORSE	SLIGHTLY WORSE	NO BETTER OR WORSE	SLIGHTLY BETTER	SOMEWHAT BETTER	MUCH BETTER
0	1	2	3	4	5	6	7

7. How would you rate this dining facility in comparison to other ISOLATED dining facilities you have worked in? (Circle one number)

This facility is:

THIS IS MY FIRST ISOLATED DINING FACILITY	MUCH WORSE	SOMEWHAT WORSE	SLIGHTLY WORSE	NO BETTER OR WORSE	SLIGHTLY BETTER	SOMEWHAT BETTER	MUCH BETTER
0	1	2	3	4	5	6	7

8. Using the scale below, please tell us how you feel about each of the following aspects of your job by circling the appropriate number for each factor.

VERY SATISFIED	SOMEWHAT SATISFIED	SLIGHTLY SATISFIED	NEITHER SATISFIED NOR DIS- SATISFIED	SLIGHTLY DIS- SATISFIED	SOMEWHAT DIS- SATISFIED	VERY DIS- SATISFIED
7	6	5	4	3	2	1

a. The physical surroundings where I work	1	2	3	4	5	6	7
b. The morale of my co-workers	1	2	3	4	5	6	7
c. My supervisors	1	2	3	4	5	6	7
d. My hours	1	2	3	4	5	6	7
e. The people who eat at this site	1	2	3	4	5	6	7
f. The location of this site	1	2	3	4	5	6	7
g. Non-food service related duties	1	2	3	4	5	6	7
h. My job OVERALL	1	2	3	4	5	6	7

APPENDIX D
Methodology for Calculating Ration Days

This appendix presents the methodology implemented to calculate (a) maximum inventory level before excess based on resupply schedules and (b) the number of days of issues in the EOM inventory based on a monthly average of rations served.

1. Resupply Schedule

$$IL_{max} = \frac{1}{RS} \times (\# \text{ of days in time interval}) + 1 \text{ day}$$

IL_{max} = Maximum inventory level in days before excess based on resupply schedules

RS = resupply schedule (the number of times the site is resupplied over a specified interval)

Example A. RS = 3 times per week = 3/week

$$\begin{aligned} IL_{max} &= \frac{1}{3x/wk} \times \frac{7 \text{ days}}{\text{week}} + 1 \text{ day} \\ &= 2.33 \text{ days} + 1 \text{ day} \\ &= 3.33 \text{ days} \end{aligned}$$

$$IL_{max} = 4 \text{ days}$$

Therefore, a site that is resupplied with issues 3 times a week should have no more than 4 days of inventory on hand.

Example B. RS = 2/wk

$$\begin{aligned} IL_{max} &= \frac{1}{2/wk} \times \frac{7 \text{ days}}{\text{week}} + 1 \text{ day} \\ &= 3.5 \text{ days} + 1 \text{ day} \\ &= 4.5 \text{ days} \end{aligned}$$

$$IL_{max} = 5 \text{ days}$$

Example C. RS = 1/wk

$$\begin{aligned} IL_{max} &= \frac{1}{1/wk} \times \frac{7 \text{ days}}{\text{week}} + 1 \text{ day} \\ &= 7 \text{ days} + 1 \text{ day} \end{aligned}$$

$$IL_{max} = 8 \text{ days}$$

2. Number of Ration days in EOM Inventory

i = Month i

\bar{R}_i = average number of rations served daily in month i

A_i = allowance earned for each ration served in month i; this is equal to BDFA in month i plus the supplemental allowance given to the site.

$(\text{EOM INV})_i$ = End-of-month inventory in month i

RD_i = Ration days in EOM inventory for month i

For any one site:

$$\text{RD}_i = \frac{(\text{EOM INV})_i}{\bar{R}_i \times A_i}$$

Example: For site H in month 5

$\bar{R}_5 = 38.2$ rations/day

$A_1 = \$4.06$ /ration

$(\text{EOM INV})_1 = \$997.57$

then

$$\begin{aligned} \text{RD}_i &= \frac{\$997.57}{\begin{array}{c} 38.2 \text{ rations} \\ \text{day} \end{array} \times \begin{array}{c} \$4.06 \\ \text{ration} \end{array}} \\ &= 6.3^* \text{ Ration Days} \end{aligned}$$

Therefore, site H had an inventory valued at approximately 6 days of rations.

Note: Any values of RD_i following the decimal point and less than 0.75 were dropped from the value of RD_i ; all others were incremented such that RD_i was rounded to the next whole number ($3.5 = 3$; $3.76 = 4$). This rounding technique results in a lower RD_i more often than the conventional technique of using 0.5 as the decision point for rounding. The effect of a lower RD_i value is that a lower value of excess inventory, if any, will result when compared to regulated inventory standard. In essence, the manager is given the benefit of the doubt for excesses in inventory not afforded by more restrictive rounding techniques.

APPENDIX E

Algebraic Determination of Operating Levels

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1. Definitions and Symbols:

The following definitions and symbols will apply throughout this Appendix.

- i = Number assigned a month
- IA_i = In-Month Allowance for month i (\$)
- IP_i = Purchased issues for month i (\$)
- Y_i = Supplemental allowance provided in month i (%)
- BL_i = Buying level for month i (%)
- BL_F = Buying level for year to date (%)
- UL_i = Utilization level for month i (%)
- UL_F = Utilization level for year to date (data available) (%)
- UI_i = Utilized issues in month i (\$)

2. Buying Levels for Month i

Purpose: To determine at what percentage above (below) the BDFA the dining facility manager is purchasing,

Let

$$Z_i = \frac{IA_i}{(1 + Y_i)}$$

Z_i = the allowance earned (\$) by the site in month i if provided by BDFA only.

$$BL_i = \frac{PI_i}{Z_i} = \frac{PI_i}{IA_i} \times (1 + Y_i)$$

Site D

Month = 1

$$Y_1 = 15\%$$

$$IA_i = \$1166.00$$

$$IP_i = \$1139.70 \text{ (from Appendix F)}$$

$$BL_i = \frac{PI_1}{AI_1} \times (1 + Y_1) = \frac{\$1139.70}{\$1166.00} \times 1.15 = 1.124$$

$$BL_1 = 1.10 \text{ (round to nearest .05)}$$

In essence, although site D is authorized to purchase issues at the BDFA + 15% for each ration served, in the first month purchased issues averaged the BDFA + 10% for each ration served.

3. Buying Levels Year to Date

Purpose: To determine the average percentage above (below) the BDFA that the dining facility manager is purchasing for the months of data collected. It should be noted that each of the sites retained the same percentage supplemental allowance for the period of data collected.

Let W be the dollar value of the allowance earned for the entire data collection period based on the BDFA only for a particular site.

$$W = \frac{IA_1}{(1 + Y_1)} + \frac{IA_2}{(1 + Y_2)} + \dots + \frac{IA_m}{(1 + Y_m)}$$

Since $Y_1 = Y_2 = \dots = Y_m$

$$W = \frac{\sum_{i=1}^m IA_i}{1 + Y_1} = \frac{\sum_{i=1}^m (IA_i)}{1 + Y_1}$$

$$W = \frac{\sum_{i=1}^m PI_i}{W} = \frac{\sum_{i=1}^m PI_i \times (1 + Y_1)}{\sum_{i=1}^m IA_i}$$

Example:

For site D for 4 months

$$Y_1 = 15\% \quad \sum_{i=1}^4 PI_i = \$ 4957.77; \quad \sum_{i=1}^4 IA_i = \$ 5012.96$$

$$W = \frac{\$4957.77}{\$5012.96} \times (1.15) = 1.137$$

BLF = 1.15 (round off to nearest 0.05)

Site D purchased issues averaged the BDFA + 15% for rations served for a 4-month period.

4. Utilization Levels for Month i

Purpose: To determine the average percentage above (below) the BDFA that the dining facility manager is utilizing issues for the months of data collected.

Let Z_i = the allowance earned (\$) by the site in month i if provided the BDFA only.

$$Z_i = \frac{IA_i}{(1 + Y_i)}$$

$$UL_i = \frac{UI_i}{Z_i} = \frac{UI_i}{IA_i} \times (1 + Y_i)$$

For site D

Month = 1

$$Y_1 = 15\%; IA_1 = \$1166.00; UI_1 = \$1054.94$$

$$UL_1 = \frac{UI_1}{IA_1} \times (1 + Y_1) = \frac{\$1054.94}{\$1166.00} \times 1.15 = 1.04$$

$$UL_1 = 1.05 \text{ (rounded to nearest 0.05)}$$

Although site D was expected to utilize an average of the BDFA + 15% for each ration served in the first month, in actuality the dining facility manager utilized only the BDFA + 5% of issues for each ration served.

5. Utilization Levels Year to Date

Purpose: To determine the average percentage above (below) the BDFA utilized by the dining facility manager in serving one ration for all the month data collected.

Let W = the dollar value of the allowance earned for the entire data collection period based on the BDFA only for a particular site.

$$W = \frac{IA_1}{1 + Y_1} + \frac{IA_2}{1 + Y_2} + \dots + \frac{IA_m}{1 + Y_m}$$

Since Y_1 and $Y_2 = \dots = Y_m$

$$W = \frac{\sum_{i=1}^m IA_i}{1 + Y_1}$$

$$ULF = \frac{\sum_{i=1}^m UI_i}{W} = (1 + Y_1) \frac{\sum_{i=1}^m UI_i}{\sum_{i=1}^m IA_i}$$

Example:

For site D for 4 months

$$Y_1 = 15\%; \quad \sum_{i=1}^m UI_i = \$4958.24; \quad \sum_{i=1}^4 IA_i = \$5012.96$$

$$ULF = \frac{\$4958.24}{\$5012.96} \times (1.15) = 1.137$$

$$ULF = 1.15 \text{ (round to nearest 0.05)}$$

The food service operation utilized issues at site D that averaged the BDFA + 15% for each ration served during a 4-month period.

APPENDIX F
Monthly Accounting Data

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Site	Month	In-Month Allowance	Purchased Issues	Beginning Inventory
A	1	\$4269.42	\$4304.03	\$ 73.30
	2	4023.74	4097.61	126.71
	3	3997.43	3952.46	227.34
	4	3627.46	3668.40	300.84
	5	3258.61	3154.52	391.94
	6	---	---	125.00
B	1	\$1531.26	\$1565.79	\$415.52
	2	1583.95	1537.56	527.26
	3	1485.52	1530.00	607.20
	4	1242.56	1250.89	299.97
	5	1370.31	1354.06	316.99
	6	---	---	180.69
C	1	\$2262.81	\$2206.48	\$157.34
	2	2103.10	2226.55	159.71
	3	2025.83	1996.09	114.18
	4	2344.20	2337.18	144.78
	5	1969.48	1890.04	65.82
	6	---	---	125.75
D	1	\$1166.00	\$1139.70	\$587.75
	2	1498.90	1763.53	672.51
	3	1257.39	1036.53	484.95
	4	1090.67	1018.01	445.89
	5	---	---	587.28
E	1	\$1630.33	\$ 912.40	\$833.22
	2	2107.11	1944.36	348.01
	3	1893.72	1849.80	245.87
	4	---	---	269.52
F	1	\$2143.21	\$2103.21	\$ 84.81
	2	2337.05	2406.58	355.70
	3	2187.64	2208.92	826.82
	4	2380.58	2351.38	1475.82
	5	1870.46	1905.85	1668.73
G	1	\$3476.73	\$3541.53	\$788.48
	2	2728.20	2714.16	394.06
	3	3189.24	3053.33	391.45
	4	---	---	842.05
H	1	\$4813.37	\$5337.04	\$104.61
	2	3787.76	4457.36	977.57
	3	4189.92	3781.71	849.31
	4	3835.86	3693.31	1158.22
	5	3631.39	3610.12	645.29
	6	---	---	1270.71

Site	Month	In-Month Allowance	Purchased Issues	Beginning Inventory
J	1	\$2722.09	\$2744.10	\$317.36
	2	2576.01	2550.45	369.36
	3	2739.38	2768.34	453.06
	4	2071.32	1989.57	204.34
	5	---	---	225.18
K	1	\$4689.92	\$4634.53	\$474.25
	2	4881.28	5077.50	465.03
	3	3946.18	4143.54	581.63
	4	4565.78	3935.05	940.88
	5	4347.55	4611.60	1036.84
	6	---	---	872.70
Q	1	\$1595.04	\$1595.60	\$148.67
	2	1158.86	1141.38	100.94
	3	1753.11	1763.71	238.89
	4	1125.00	1124.22	164.25
	5	915.33	952.97	65.57
	6	---	---	77.30
R	1	\$538.48	\$502.19	\$72.42
	2	570.83	565.52	33.16
	3	498.15	497.63	56.96
	4	477.51	485.91	42.90
	5	783.84	773.31	65.21
	6	---	---	40.73
S	1	\$6401.10	\$6279.47	\$1267.55
	2	4726.60	4857.61	846.14
	3	4426.36	4326.20	719.57
	4	4712.11	5214.67	536.61
	5	5986.53	5750.96	1396.06
	6	---	---	513.00
AA	1	\$11,778.95	\$11,440.79	\$3262.53
	2	8,908.36	9,033.08	513.76
	3	11,717.32	11,564.80	856.39
	4	11,732.78	11,729.74	487.47
	5	10,845.68	10,764.26	856.06
	6	---	---	572.12
AB	1	\$63,842.08	\$63,023.45	\$ 4495.90
	2	63,201.26	64,060.29	10,081.66
	3	73,443.21	73,511.04	13,083.93
	4	66,286.50	66,261.41	7547.69
	5	64,239.87	65,215.96	7668.74
	6	68,103.15	63,588.30	8461.22
	7	79,992.58	81,265.73	5045.50
	8	---	---	18,084.87

APPENDIX G
Food Service Equipment Available by Site

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SITE:

EUROPE

KOREA

ITEM	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y
Range (Hot/Grill Top)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Oven (Bake and Roast)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Stove (Commercial)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Griddle	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Deep Fat Fryer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Refrigerator	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Freezer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Coffee Maker	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Beverage Dispenser	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Milk Dispenser	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Toaster	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ice Machine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dish Washer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Steam Table	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

APPENDIX H

New Accounting System

1. New Accounting System

The Dining Facility Account Card (DA 3980-R, see Appendix A), as currently configured, does not provide immediate access to all the information required to determine the dining facility manager's utilization variance. However, with minor additions and changes, a form can be developed to ease this calculation. A possible configuration of the new dining facility account card is presented in Figure H-1. This sample form is very similar to the current DA 3980-R and would be completed in the same manner, as prescribed in AR 30-1. However, the following line item changes would be incorporated.

a. Item 11, column 1: The dining facility manager will record the FY to date utilization variance as reported in item 20 of the previous month's account card.

b. Item 12, columns a through j: Report data in same manner as currently done: line item entries will be made on days of receipt of issues.

c. Item 12, column k: Monetary variance, computed by subtracting cumulative in-month allowances (item 12, column h), from cumulative issues (item 12, column j), will be recorded in column k whenever a line entry is made in item 12.

d. Item 12 column 1: The FY to date status, computed by adding the monetary variance (item 12, column k), to the previous FY to date status (item 12, column 1), will be recorded in column 1 whenever a line entry is made in item 12.

e. Item 13: Entries made in this item will include forced issues, box lunches, test items, etc.

f. Item 14 column b through f: Headcount data for the month will be summed by meal and recorded in the appropriate column.

g. Item 14 columns h, j, k, and l: The last recorded figures in these columns for items 12 or 13 will be written in their respective columns in item 14.

h. Item 15: Beginning Inventory, as reported in item 2a:

i. Item 16: Value of the EOM physical inventory.

j. Item 17: The signature of the disinterested officer verifying the accuracy of the value of the EOM inventory.

k. Item 18: Inventory change is equal to the beginning inventory, item 15, less EOM inventory, item 16.

DINING FACILITY ACCOUNT CARD							1. ACCOUNTING PERIOD	2. UNIT	2a. VALUE OF BEGINNING INVENTORY			
3. BDFA		MEAL VALUE					9. <input checked="" type="checkbox"/> ACTIVE ARMY <input type="checkbox"/> OTHER (SPECIFY)		10. CARD VERIFIED BY (ACCOUNTABLE OFFICER)			
		4. BREAKFAST	5. LUNCH	6. DINNER	7. BRUNCH	8. DNR/BRCH						
ITEM	DATE	HEADCOUNT					ALLOWANCE FOR TODAY	CUMULATIVE ALLOWANCE (g + h)	VALUE OF FIELD RATION ISSUED	CUMULATIVE VALUE OF ISSUES (i + j)	(+) OR (-) MONETARY VARIANCE (f - h)	(+) OR (-) FY TO DATE STATUS (k + l)
		BREAKFAST	LUNCH	DINNER	BRUNCH	DNR/BRCH						
	a	b	c	d	e	f	g	h	i	j	k	l
11	FY TO DATE	X	X	X	X	X	X	X	X	X	X	
12												
OPERATION DATA												
13	OTHER											
14	TOTAL						X		X			
15. BEGINNING INVENTORY						16. ENDING INVENTORY			17. ENDING INVENTORY VERIFIED BY			
18. INVENTORY CHANGE (+) OR (-) (15 - 16)						19. UTILIZATION VARIANCE (+) OR (-) (14k + 18)			20. FY TO DATE UTILIZATION VARIANCE (+) OR (-) (11L + 19)			

FIGURE H-1. Proposed dining facility account card.

l. Item 19: Utilization Variance is determined by adding the inventory change (item 18) to the monetary variance (item 14, column k).

m. Item 20: The FY to date Utilization Variance is equal to the sum of utilization variance (item 19) and the previous month's FY to date status (item 11, column l).

In implementing this method of computation, the goal is to provide the manager or account card reviewer two possible areas of examination when utilization variances appear large. First, the manager/reviewer will examine the inventory change (item 18) to determine if problems exist in inventory management. Large negative or positive changes in inventory may require further review of the manager's inventory policy for possible corrective action. Second, the manager/reviewer can examine the monetary variance to ascertain the manager's purchasing behavior. By analyzing these two components of utilization variance, the manager or unit commanders and food service advisers can identify the problem areas and provide concrete recommendations for their resolution.

2. Evaluation

Since the dining facility accounts vary in size, the in-month allowance should be used as the normalizing factor for determining the manager's effectiveness in utilizing issues and controlling inventories. The technique is very similar to the one in current use and would only require that the end of month values for utilization variance, FY-to-date utilization variance, inventory change, and monetary variance each be divided by the in-month allowance and multiplied by 100%. Suggested tolerance limits for each of these four measures are listed below.

a. Utilization Variance

The tolerance limit should provide some indication of whether the supplemental allowance given these small sites is too low or too high for serving one ration. The upper and lower limit of the tolerance should approach the next level of supplemental allowance. Since each level is incremented by 5%, a tolerance spread of $\pm 5\%$ of the in-month allowance will provide sufficient indication of the adequacy of the supplemental allowance provided the site. Note, utilization variances calculated to be outside this tolerance range only indicate that possible problems exist in either inventory control or purchasing behavior, or both. Changes in supplemental allowances should only be deemed necessary after inventory control and purchasing behavior problems have been resolved, and the utilization variances for several consecutive months were still calculated to be out of tolerance.

The definitions and formulas used to calculate utilization variance are as follows:

Calculation of Utilization Variance

Step

By Definition:

$$\text{Utilized Issues} = \text{Purchased Issues} + \text{Beginning Inventory} - \text{Ending Inventory} \quad (\text{H-1})$$

$$\text{Inventory Change} = \text{Beginning Inventory} - \text{Ending Inventory} \quad (\text{H-2})$$

Therefore,

$$\text{Utilized Issues} = \text{Purchased Issues} + \text{Inventory Change} \quad (\text{H-3})$$

By Definition:

$$\text{Utilization Variance} = \text{Utilized Issues} - (\text{In-Month Allowance}) \quad (\text{H-4})$$

From equation 3 above:

$$\text{Utilization Variance} = \text{Purchased Issues} + \text{Inventory Change} - (\text{In-Month Allowance}) \quad (\text{H-5})$$

By Definition:

$$\text{Monetary Variance} = \text{Purchased Issues} - (\text{In-Month Allowance}) \quad (\text{H-6})$$

Therefore:

$$\text{Utilization Variance} = \text{Monetary Variance} + \text{Inventory Change} \quad (\text{H-7})$$

b. Inventory Change

Indication of two potential problem areas may result from the analysis of inventory data. First, the account card reviewer should determine if the manager incurred excess inventory for the month. Simply by dividing the ending inventory by the in-month allowance and multiplying by 100%, the reviewer can determine the percentage of in-month allowance earned that is available in inventory. By applying the definition of excess inventory, per AR 30-1, a maximum inventory level can be determined and compared to the ending inventory. Table H-1 presents the possible issue cycles and the maximum percentage of in-month allowances available in the EOM inventory before inventories can be considered excess.

TABLE H-1. Excess Inventory Standards

<u>Issue Cycle</u>	<u>Maximum % Inventory</u>
Three times a week	13%
Two times a week	17%
Once a week	27%
Once a month	50%

If the percentage of earned in-month allowance available in EOM inventory is greater than 13% and the issue cycle is three times per week, then the dining facility has excess inventory. A review of the last date of issue and whether the manager is hoarding (in anticipation of a large increase in headcount or a history of poor weather conditions, especially for the more distant small sites) should be conducted. After this review, if the inventory is still considered in excess, the dining facility manager need only reduce his purchases in the following month and draw upon his inventory.

A second potential problem area can be identified when a large fluctuation in inventories is noted. Normalized inventory change greater than + 10% of the in-month allowance may be indicative of inconsistent inventory policies. The tolerance limit of + 10% is suggested since over 25% of the monthly inventory data for small sites exhibited inventory changes greater than 10%, most of which lead to excess inventories in subsequent months. If no extenuating circumstances such as headcount fluctuations or weather can be attributed as the cause of this problem, those food service operations exhibiting inventory changes greater than + 10% should conduct more frequent physical inventories to ensure proper usage of inventories on hand. This is explained in more detail in Recommendation 3, under Operations Management.

c. Monetary Variance

Since the ideal operating efficiency would occur when utilization variance is zero, the monetary variance should, as much as possible, offset any value of inventory change. For example, if the inventory change in June was + \$500, then it should be expected that the monetary variance should approximate - \$500, that is, purchases will be \$500 less than in-month allowances. Therefore, the tolerance limits for the normalized monetary variance should be $\pm 10\%$ of the in-month allowance as is the case for inventory change.

d. FY-to-Date Variance

As in utilization variance, the suggested tolerance limits are $\pm 5\%$. If, after inventory control and purchasing practice problems have been resolved, the normalized FY-to-date utilization variance

approaches or exceeds the tolerance limits in one direction for several consecutive months, then a change in the supplemental allowance provided to the site should be considered as a possible solution. Clearly, before any changes in the allowance are made, the food service adviser should take care that the site manager is doing all he can to furnish high quality food service to the soldiers. However, the allowance for serving one ration should never be less than the BDFA, and those sites exhibiting utilization variances of less than the BDFA for each ration should be examined in considerable detail -- menus offered, recipes used, etc.

3. Consumption Analysis

The technique developed to determine the end-of-month status of a food service operation can be used several times during the month by the dining facility manager to determine his current status. This approach is used by many commercial restaurants and is known as Consumption Analysis. By conducting periodic consumption analyses during the month, the dining facility manager can determine his management requirements for the remainder of the month. The procedure of conducting the consumption analysis during the month is the same as the end of the month requirements, and is presented below.

Consumption Analysis Procedure

On the day the manager wishes to conduct the consumption analysis and after the last meal, the following data will be recorded on a blank (or unofficial) account card.

1. Item 14 columns b-f: the summation of the headcount data recorded on the official account card from the first of the month to the present date. This will provide an indication of the expected headcount for the remainder of the month.

2. Item 14 columns h, j, k, and l: the last recorded figures in item 12, columns h, j, k, and l from the official account card.

3. Item 14: beginning inventory as recorded in item 2.a. of the official account card.

After the last meal of the day, the dining facility manager will have to conduct a physical inventory of his stores. This value will be recorded in item 16 of the official account card.

Items 18, 19, and 20 will be completed as shown on the account card.

Once data is recorded on the unofficial account card, the dining facility manager can review the results to identify potential problem areas. If the utilization variance is too high or too low, the manager can determine if his problem is in portion control or serving too many high- or low-cost items, and resolve the problem by the end of the month. If inventory change is too large after taking into account the issue cycle, the manager can determine the inventory utilization strategy to use to bring it into line by the end of the month. Purchasing practices can be modified if monetary variance appears irregular. As a management tool, consumption analysis affords the dining facility manager the opportunity to offer each enlisted active duty soldier his basic daily food entitlements and high quality food service, while ensuring the most effective and efficient use of resources available.

Finally, the dining facility manager should conduct a consumption analysis as often as once a week; however, due to demanding schedules and time required to conduct a physical inventory, this may not be possible. At a minimum, the manager should conduct the analysis every time his account card is reconciled by the TISA. The reason for this timing is that the official account cards will be considered accurate by both the TISA and the dining facility manager. Thus, by conducting accurate inventories at this time, the dining facility managers, through consumption analysis, can calculate the up-to-date official issue purchasing and utilization status and implement a plan of action required to maintain or bring their accounts to within acceptable tolerances by the end of the month. In essence, effective and efficient food service operations will require the managers to maintain a constant awareness of their operating status. Those facilities that exhibit several problem areas the previous month should be required to conduct the consumption analysis more often. Some commercial restaurants conduct a consumption analysis on a daily basis.

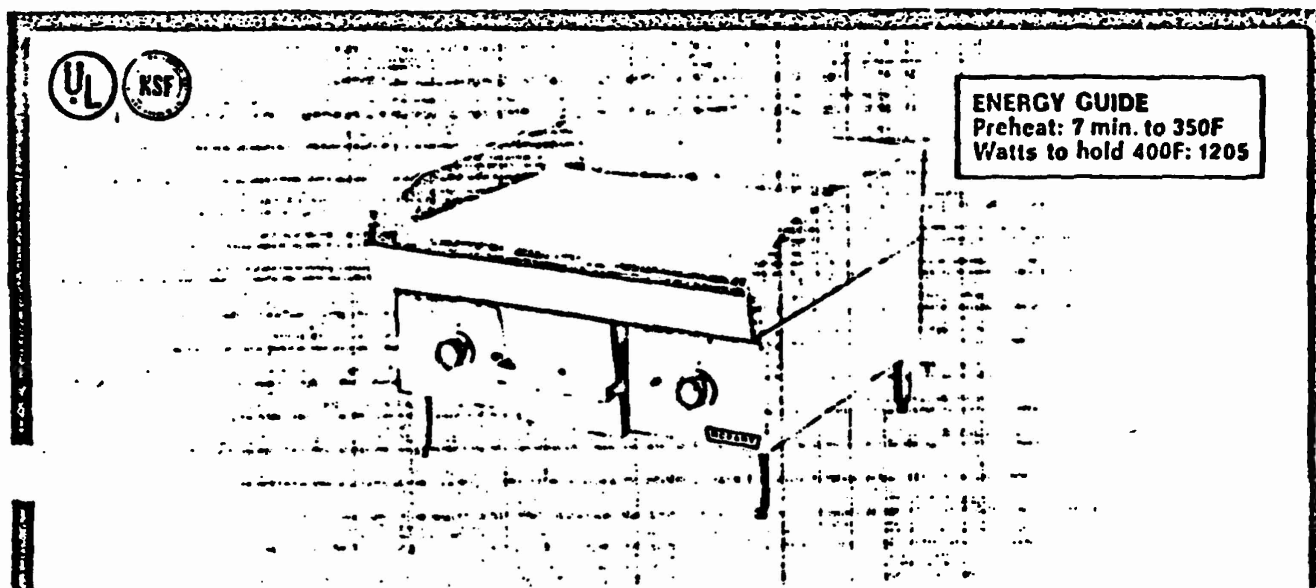
APPENDIX I
Small Modular Equipment



FOOD EQUIPMENT

2-ft. model

CG20 - 24" W x 25-5/32" D.



ENERGY GUIDE
Preheat: 7 min. to 350F
Watts to hold 400F: 1205

high production, uniform perimeter heating

Electric free-standing counter griddle is 24" W x 25-5/32" D and preheats to 350F in 7 minutes. Griddle banks with other Rocket griddles or Rocket devices, also mounts on optional stand.

Unit has 24" W x 18" D, 432-sq.-in. griddle surface and produces the following hourly quantities: 480+ 2 1/4 oz., 3 1/2"-dia. hamburgers (32 per load); 260-320 4" pancakes (21 per load), and 14+ 4 oz., 1/2" thick minute steaks (12 per load).

Unit has uniform pattern of enclosed tubular stainless steel heating units. Hot and cold spots are eliminated and the perimeter is heated. Heating units are attached to grid's bottom. Front and rear grease troughs, two signal lights and two thermostatic controls are standard. Power terminal box is at left rear. Front and rear full-width grease troughs direct grease to removal chute. Full-depth grease drawer is front removable.

Cabinet and heating units are stainless steel. Grid surface is 1/2-inch-thick polished steel. Three-inch high splatter guard is cold-rolled steel and is welded to the griddle bottom. Four 4-inch high plastic legs with adjustable feet are included.

Two thermostats provide independent control of two separate 12" W griddling areas. Temperature range is 200-450F. A signal light for each thermostat indicates whether or not that thermostat is operating and when present temperature is reached.

(Specifications continued on reverse)

more uniform grid temperatures, with variances reduced by up to 33%, are result of 1) more uniform heating pattern; 2) better element clamping and 3) additional heat-retaining baffle.

Improved heating elements, clamping arrangement and extra heat-retaining baffle reduce watts to hold, thereby improving energy efficiency.

heating units are in direct contact with the bottom of grid surface for optimum heat transfer. Gives high production, responds quickly after adding cold loads.

two independently controlled cooking areas. Use only the amount of griddling surface needed. Handy knockouts in back and bottom permit connections to suit varied conditions.

ACCESSORIES

- CX354 Set of four 4" high S/S legs with adjustable feet
- CX414 2' stand without casters
- CX416 2' stand with casters

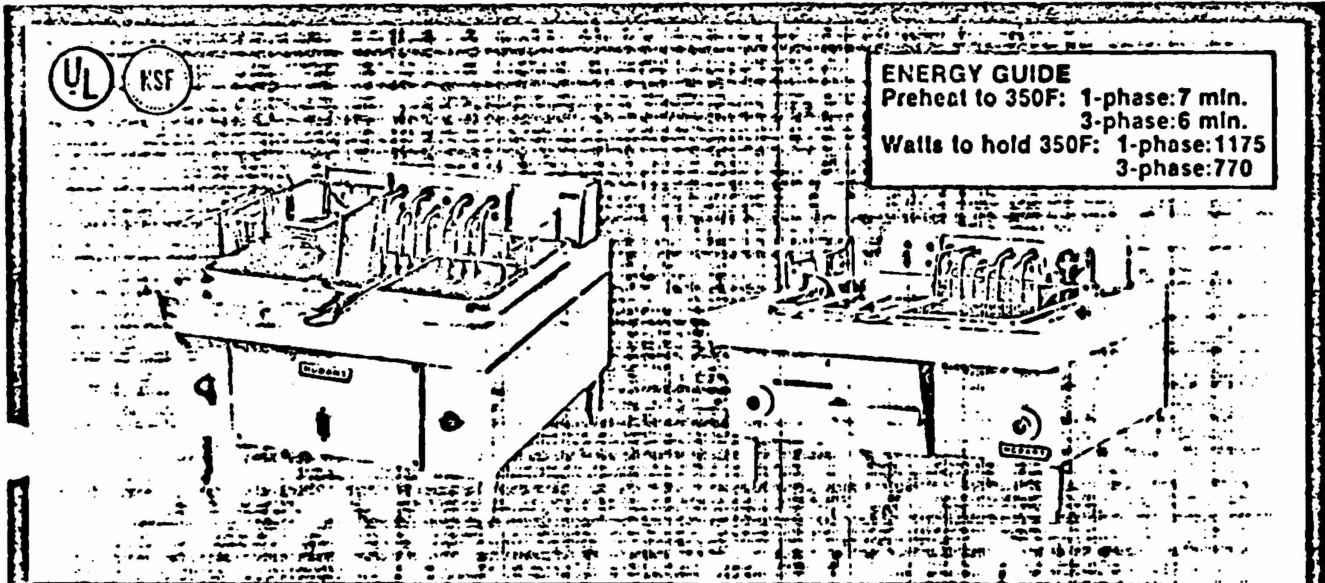
electromechanical
control system



FOOD EQUIPMENT

28-lb. shortening
capacity models

CK20
CK201 • dual TOUCHTIME® lifts



ENERGY GUIDE	
Preheat to 350F:	1-phase: 7 min. 3-phase: 6 min.
Watts to hold 350F:	1-phase: 1175 3-phase: 770

easy operation, improved protection

Free-standing electric fryers hold up to 28 lbs. of shortening. Shortening must be of a type recommended for use in commercial fryers. Both preheat to 350F in 6-7 minutes. Model CK201 is equipped with two independently operated automatic TOUCHTIME basket lifts (see "Electrical Timers"). Standard factory-installed internal POWER TURNOFF on CK20, optional on CK201.

28 lbs. of shortening in a removable container (one furnished). Produce up to 61 lbs. or 313 two-ounce servings of raw-to-done French fried potatoes or 603 two-ounce servings of blanched potatoes per hour.

Fryers mount on 4" plastic legs (furnished). Models accommodate accessory shortening removal and straining devices; are furnished with two standard fry baskets. Models have enclosed tubular stainless steel heating elements which swing up and burn clean in the raised position. Shortening container is equipped with easy-grip, lift-out handles; is scored to indicate level of fat-fill.

"POWER ON" switch located on front panel (CK20), heating element support (CK201), ties in with signal light on heating unit support head. A separate signal adjacent to the "POWER ON" signal light, cycles with the thermostat, indicates when fryer is heating and when preset temperature is reached. Temperature range: 200F-400F. Separate temperature limiting thermostat for overheat protection, requires manual resetting when tripped, is integral to each model. Factory installed internal POWER TURNOFF standard on CK20, optional on CK201.

Model CK201 has two integral push button timers with automatic reset and adjustments from 0-15 (specifications continued on reverse)

DESIGN HIGHLIGHTS

QUAD-GARD™ control protection — Features two contactors and two thermostats which work redundantly to provide reliable interruption of current to heating elements. Prevents overheating in the remote event of a component malfunction. Built-in POWER TURNOFF (supplied as standard on CK20; optional extra on CK201) complies with National Fire Protection Association Standard (NFPA 96) by shutting off power to fryer automatically when activated externally by hood fire extinguishing system.

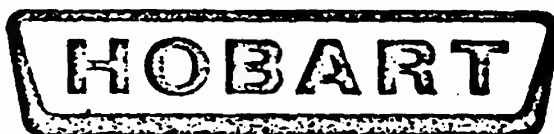
EASY INSTALLATION — Only one field connection is required to make the internal POWER TURNOFF operational. The 120-volt circuit of the fire-extinguishing system is connected to a terminal block on the fryer.

DEPENDENT DESIGN — (CK201) designed for long life. Since bearings are not in direct line with the shaft, they are more likely to last longer without excessive maintenance and cleaning.

HEATING ELEMENTS — Heating elements burn themselves clean in raised position. Merely brush off the ash residue.

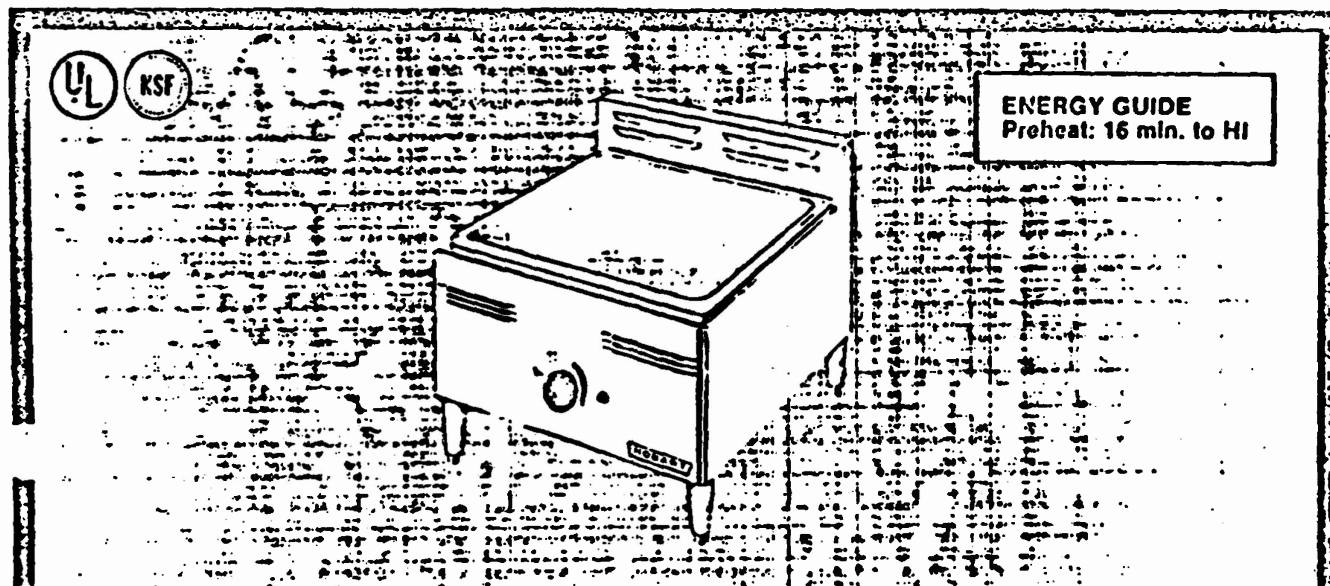
COMPACT DESIGN — For fast food operations where speed and big kitchen production are essential in a small area. Compact design allows one person to cook and serve hot food products — no wasted steps — no lost motion — fast service.

EASY MAINTENANCE — Facilitates raising and lowering heating elements.



FOOD EQUIPMENT

HF1 — free standing



for warming, holding versatility

Model HF1 electric, free-standing counter food warmer preheats to "HI" in 16 minutes, banks with other custom matched counterline devices and is designed for wet or dry operation.

Inside dimensions of food warmer base: 15 1/2" W x 15 1/2" D (front to back). Height of inner receptacle is 6-5/32". Accessory packages include four 4-quart jars; or a soft warmer assembly (cap'y. 9 doz. med. rolls); or various other utensils for warming liquid and/or solid foods.

Food warmer base is specifically designed to accept any of five accessory holding/warming packages. Device can be safely installed against a wall or partition, mounts on 4" plastic legs (furnished), and has 36" heavy-duty cord with plug. Seamless heat well has rounded corners, obtains direct heat from enclosed tubular heating element under which is a metal heat deflector supported by a metal cover.

Heating element is stainless steel. Cabinet is grained nickel-chrome plated steel, finished to resist stains. Heat well is one-piece aluminum. Plastic legs are furnished standard; stainless steel legs are optional extra.

Single thermostat controls OFF-HI temperature range. A signal light indicates whether or not unit is operating and when pre-set temperature is reached.

1.65 KW. Device is not fused and must be connected to a properly fused circuit, single phase only. See Electrical Data block for phase loading.

(specifications continued on reverse)

— Uniform heating element pattern avoids hot and cold spots.

— Heating element is in direct contact with the bottom surface for optimum heat transfer. Gives fast preheat, recovers quickly after adding cold loads.

— Ideal for small fast-food operations.

— Five accessory packages transform basic device into a warming/holding unit for solid or liquid foods, or a combination of both.

ELECTRICAL DATA

MODEL	TOTAL KW	TEMP. RANGE	PRE-HEAT TIME (MIN. TO HI)	NOMINAL AMPERES PER LINE	
				1-PHASE, 50/60 HZ.	
				115 VAC	208 VAC/240 VAC
HF1	1.65	OFF-HI	16	14.3	7.9/6.9

Rated voltages 115, 208, 240 VAC, 1-phase, 50/60 Hz.

HOBART

FOOD EQUIPMENT

FOOD EQUIPMENT

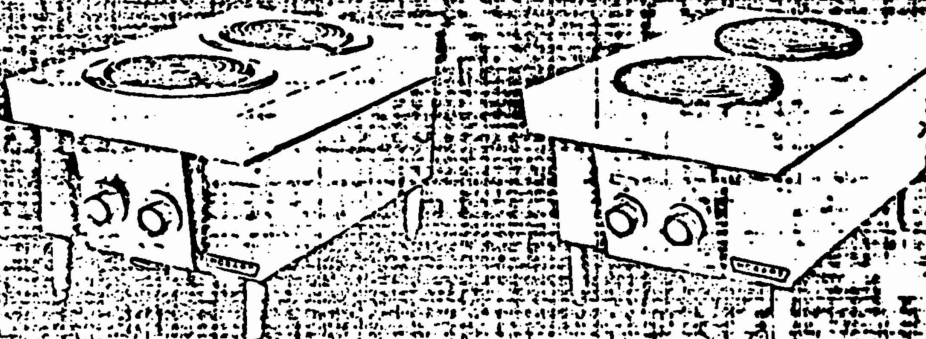
CH20 - 2 heating elements
CH22 - 2 French hotplates



ENERGY GUIDE

preheat:

- CH20 — 3 min. to 1200F
- CH22 — 12 min. to 1050F



for high-speed or heavy-duty performance

ELECTRICAL, GENERAL & DIMENSIONAL DATA

MODEL	TOTAL KW	AMPS		PHASE	DIAMETER OF HEATING UNITS		OVERALL DIAMETER (COLLAR)		OVERALL WIDTH		OVERALL DEPTH		OVERALL HEIGHT (LESS LEGS)		NO. OF UNITS	PRE- HEAT TIME (MIN.)	TEMP. RANGE	WEIGHTS			
		208V	240V															SHIP		NET	
					IN.	MM.	IN.	MM.	IN.	MM.	IN.	MM.	IN.	MM.				LBS.	KILOS	LBS.	KILOS
CH20	5.2	25.0	21.7	1*	8	203	10.5	267	14.5	368	25.16	639	9.75	248	2	3 to 1200F	OFF to HI	31	79	25	64
CH22	4.0	19.2	16.6	1*	8	229	9	229	14.5	368	25.16	639	9.75	248	2	12 to 1050F	OFF to HI	39	99	33	84

Connect to single phase power source or 1-phase of a 3-phase system. Rated Voltages: 208, 240 VAC, 50/60 Hz.

Free standing counter CH20 electric free-standing counter hotplate has two self-cleaning, high-speed heating elements. CH22 has two solid French hotplates. Both models have four 4-inch adjustable plastic legs. CH20 boils 4 quarts of room temperature water in less than 8 minutes. CH20 preheat time is 3 minutes to 1200F. CH22 boils 96 oz. water in 10½ minutes, preheats to 1050F in 12 minutes.

CH20 heating units are 8 inches in diameter from element to element. Overall diameter of each heating unit is 10½ inches. CH20 accommodates fry pans, kettles, or similarly sized utensils and vessels for pan-frying, sauteing, preparation of sauces, gravies and coffee making. CH22 elements are 9" diameter, accommodate small stockpots.

(Specifications continued on reverse)

DESIGN HIGHLIGHTS

Compact Design - Use CH20 for operations where speed and production are essential in a small area. Use CH20 for slower foods such as chili. Compact design allows one person to cook and serve hot food products — no wasted steps — no lost motion, service.

EASY CLEAN - Heating elements (CH20) burn themselves clean. Units lift up, allowing easy removal of reflector pans for pot-sink cleaning (CH20 only). Both models have full-width, removable grease tray.

CONDUIT - 1-3/32" and 7/8" diameter conduit knockouts in back and bottom.

VERSATILE - Use CH20 for skillet frying, sauteing, coffee making. Use CH22 for heavy-duty use with small stockpots. Eight dial settings to control heat.

APPENDIX J
Amoco Insulated Container

NOMENCLATURE

Container, Insulated, Food Transport

CLIMATIC CATEGORY

All climates

STOCK NO.

None

SPECIFICATION

COST - (SEPT 1980)

\$160.00

Amoco Chemicals Corp.
Manufacturer's Part No:
"485-202 Insulated Tote"

PHYSICAL DATA

1. WEIGHT

24 pounds, 15 ounces

2. DIMENSIONS

32" long x 22" wide x 19" high.

3. CAPACITY

3.9 cu. ft.

4. MATERIALS

Outer and inner liners are of plastic material with foamed-in-place insulation.

5. PERFORMANCE

Frozen foods can be transported in an ambient temperature of 125°F for 4 hours with a temperature increase of approximately 6°. Hot foods can be transported in an ambient temperature of -25°F for 4 hours with a temperature decrease of approximately 21°.

DISCUSSION AND DESCRIPTION

The container is of commercial design and is used in the private sector for school lunch programs. The item has been used successfully to transport perishables and frozen foods from military supply depots in Korea, Germany, and Italy to remote sites over difficult terrain.